UNITED STATES OF AMERICA:
WAR DEPARTMENT.

MONTHLY WEATHER REVIEW.

(GENERAL WEATHER SERVICE OF THE UNITED STATES.)

SEPTEMBER, 1888.

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1888.

List of merchant marine steam and sailing vessels from which International Meteorological reports were received at the Office of the Chief Signal Officer, U. S. Army, Washington, D. C., in time to be used in the preparation of the Weather Review for the month of September, 1888.

Name of vessel.	Captain.
Br. s. s. Adriatic	Capt. J. G. Cameron.
Advance	D. E. Griffiths.
Aguan	J. C. Adair.
Alisa	J. W. Morris.
Am. Alamo	S. Bisk.
Br. Alaska	W. I. Robertson.
Alene	E. J. Selders.
Ger. Aller	H. Christoffers.
Br. Alps	Wm. Owen.
Alvo	D. Williams.
Ger. America	H. Heineke.
Br. Anchoria	W. Brown.
Am. Andes	J. Evans.
Br. Arizona	S. Brooks.
Athos	H. Low.
Auranis	W. H. P. Hains.
Australia	A. McRitchie.
Nor. Balder	F. Mohn.
Br. Baltimore	J. Trenery.
Ger. Baltimore	G. Thumau.
Br. Barracouta	R. R. Hubbard.
Barrowmore	John Inch.
Ger. Baumwall	C. W. Rehse.
Belg. Belgenland	W. A. Beynon.
Br. Bengore Head	J. R. Brady.
Span. Benito Estenger	E. F. Canal.
Ger. Bohemia	E. Kopff.
Br. Bothnia	E. Dutton.
Britannic	H. Parsell.
British King	John Kelly.
British Prince	Thos. Nowell.
British Princess	E. H. Freeth.
British Queen	R. Wills.
Brooklyn City	W. Fitt.
Buffalo	J. H. Malet.
Bulgarian	R. Leask.
Ger. California	O. Winkler.
Br. Canada	R. Goudie.
Caribbean	H. Daniel.
Carroll	G. H. Brown.
Caspian	A. McDougall.
Catalonia	J. J. Atkin.
Celtic	P. J. Irving.
Cephalonia	Henry Walker.
Cervin	S. Hughson.
Chester	S. Wohlmuth.
Circassia	A. Campbell.
Circassian	R. Barrett.
Am. City of Augusta	J. W. Catherine.
City of Alexandria	John Deaken.
Br. City of Berlin	F. S. Land.
Am. City of Chester	Robert Boyd.
Br. City of Chicago	A. W. Lewis.
Am. City of Dallas	C. W. Read.
Br. City of New York	Fred. Watkins.
City of Richmond	A. Redford.
City of Rome	H. Young.
Am. City of Washington	J. W. Reynolds.
Br. Colna	R. C. Jennings.
Coton	F. Henderson.
Celonia	W. Bocke.
Am. Colorado	F. E. Jenkins.
Belg. Counsellor	W. Lang.
Dalton	J. Russell.
Denmark	R. S. Rigby.
Devonia	John Craig.
Ger. Donau	W. Topser.
Br. Durian	J. MacFarlane.
Durham City	D. D. Galbraith.
Earnmoor	R. Grey.
Dtch. Edam	W. Bakker.
Br. Edith Godden	J. H. Bennett.
Egypt	J. Sumner.
Egyptain Monarch	J. W. Bristow.
Ger. Elder	H. Baur.
Elbe	G. Meyer.
Am. El Paso	H. S. Quick.
Span. Emiliano	J. de Bengos.
Ger. Ems	Th. Jüngst.
Br. England	A. F. Heeley.
Erin	Wm. Tyson.
Ethiopia	John Wilson.
Etruria	T. Cook.
Sp. Euskaro	S. de Folleris.
Br. Exeter City	Thos. L. Weiss.
Explorer	E. A. Brown.
Fanita	A. C. Brunn.
Br. Federation	R. Pinkham.
Ger. Francia	C. Kaempff.
Br. France	A. D. Hadley.
Fr. France	C. Collier.
Ger. Fulda	B. Rugk.
Br. Furnessia	J. Hedderwick.
Span. Gaditano	F. Goicoecua.
Br. Galileo	Wm. Magee.
Sp. Gallego	J. B. Anicalzuga.
Br. Gallia	M. Murphy.
Ger. Gellert	W. Kuhlewein.
Br. Germanic	B. Gleadell.
Glendale	W. Dickman.
Grecian	C. E. LeGallais.
Greece	A. J. Jeffrey.
Gussie	Robert Staples.
Gothenburg City	
Hammonia	C. Hebich.
Den. Hekla	A. G. Thomsen.
Br. Helvetia	G. Cochran.
Ger. Hermann	A. Kohlman.
Br. Herschel	Geo. Braithwaite.
Hibernian	John Brown.

Name of vessel.	Captain.
Br. s. s. Holland	Capt. Thos. Foote.
Ger. Holsatia	C. Droescher.
Br. Hondo	J. Brownrigg.
Por. Iniziatovi	A. Canzoneri.
Am. Indiana	W. J. Boggs.
Br. Iowa	E. W. Owens.
Italy	W. Pearce.
Ixia	Wm. Churnside.
James Turpie	Wm. Smith.
Kansas	W. Gleig.
Kate Fawcett	W. F. Young.
Fr. La Bourgogne	E. Franguel.
La Bretagne	M. de'Jousselin.
La Champagne	Boyer.
La Gascogne	Santelli.
Ger. Lahn	H. Hellmers.
Br. Lake Huron	M. L. Tranmar.
Lake Ontario	H. Campbell.
Lake Winnipeg	P. D. Murray.
Am. Lampassas	M. B. Crowell.
Fr. La Normandie	G. Kerusbec.
Dtch. Leerdam	G. Stenger.
Llandaff City	T. H. Gore.
Br. Lord Clive	P. Urquhart.
Lord Gough	E. M. Hughes.
Lord O'Neill	A. Ferris.
Am. Louisiana	E. V. Gager.
Br. Ludgate Hill	Jas. Brown.
Lydian Monarch	T. C. Huggett.
Madura	R. Doyle.
Ger. Main	W. Reimkasten.
Am. Manhattan	Frank Stevens.
Br. Manitoban	Wm. Dunlop.
Marcea	L. O. Moen.
Maranhense	F. B. Tregarthen.
Martello	Wm. Abbott.
Marsala	N. Maas.
Br. Marengo	W. Whitton.
Maryland	A. H. Luckhurst.
Mentmore	R. Boucher.
Span. Mexico	Carmonia.
Br. Michigan	H. Bocquet.
Minnesota	R. J. Blacklin.
Fr. Molvina	C. Dupay.
Ger. Moravia	Bahrends.
Span. Murciano	E. de Luaraga.
Br. Muriel	G. S. Locke.
Belg. Nederland	A. J. Griffin.
Br. Nestorian	John France.
Am. Newport	Chas. C. Lima.
New York	Geo. Mason.
Belg. Noordland	H. E. Nickels.
Nor. Norrona	J. J. Isakjen.
Br. Norseman	R. Williams.
Nova Scotian	R. H. Hughes.
Am. Nueces	Geo. Bolger.
Br. Oceano	Thos. Walker.
Ohio	R. W. Sargent.
Oregon	H. C. Williams.
Parisian	W. H. Smith.
Dtch. P. Caland	A. Potjer.
Am. Philadelphia	Sam. Hess.
Br. Phoenician	D. J. James.
Ger. Polaria	E. Schuck.
Polynesia	A. Kuhn.
Br. Pomeranean	H. Dalziel.
Pomona	J. Legoe.
Poutiac	H. W. Brown.
Powhatan	John Jenkins.
Preussen	C. Pohle.
Dtch. Prinz Fred. Hendrik	C. Rademaker.
Prinz Maurits	H. Sluiter.
Br. Prussian	J. Amberg.
Ger. Rhaetia	H. Vogelgesang.
Rhein	W. Kuhlmann.
Rhenania	G. Schmidt.
Belg. Rhynland	J. C. Jamison.
Am. Rio Grande	Jas. F. Lewis.
Fr. Rio Negro	Guegan.
Belg. Robina	T. H. Smith.
Br. Romna	E. Maddox.
Dtch. Rotterdam	H. C. v. d. Zee.
Br. Roxburg Castle	A. Turpin.
Ger. Rugia	R. Karlowa.
Saale	H. Richter.
Br. Saint Romans	H. Campbell.
Samaria	J. B. Watt.
Santiago	J. B. Allen.
Sarnia	J. Gibson.
Scandinavian	John Park.
Dtch. Schiedam	K. Mensonides.
Br. Scythia	T. Roberts.
Serapis	Geo. Dobson.
Span. Serra	F. de Luzarraga.
Br. Servia	M. McKay.
Siberian	R. P. Moore.
Ger. Slavonia	H. Schmidt.
Br. Spain	W. A. Griffiths.
State of Georgia	G. Moodie.
State of Indiana	A. Bitchie
State of Nebraska	A. G. Brace.
State of Nevada	J. A. Stewart.
State of Pennsylvania	A. J. A. Mann.
Strabo	A. Matheson.
Straits of Gibraltar	Geo. Grigs.
Stockholm City	W. Thompson.
Ger. Suevia	C. Ludwig.
Fr. Sully	A. Voisin.
Br. The Queen	J. P. Heeley.
Tafna	Williams.

Name of vessel.	Captain.
Br. s. s. Tower Hill	Capt. H. Perry.
Ger. Trave	W. Willegerod.
Br. Trinacria	Geo. Mitchell.
Trinidad	W. J. Fraser.
Tyrian	A. Haig.
Fr. Uruguay	C. Guen.
Br. Vancouver	C. J. Lindall.
Venetian	E. Parry.
Viola	L.
Waldensian	A. Whyrite.
Belg. Waesland	H. Buschmann.
Ger. Wandrahm	T. Porath.
Wergeland	L. W. Hansen.
Werra	B. Buesuis.
Weser	A. Bruns.
Western Chief	Fred Lander.
Belg. Westernland	W. G. Randle.
Ger. Wieland	A. Albers.
Br. Wisconsin	Riward Bentley.
Ger. Wyanoke	R. B. Boaz.
Br. Wylo	T. Rogers.
Wyoming	C. L. Rigby.
Dtch. Zaandam	W. Ponson.
Belg. Zeeland	C. H. Grant.
New York Herald Weather Service.	
Br. Algiers	J. B. Percy.
Am. El Monte	J. W. Hawthorn.
Br. Knickerbocker	F. Remble.
Orinoco	Jas. S. Garvin.
United States Naval.	
U. S. C. S. A. D. Bache	J. F. Moser.
U. S. S. Atlanta	F. M. Bunce.
U. S. C. S. Blake	J. E. Pillsbury.
U. S. S. Constellation	C. J. Train.
U. S. R. S. Dale	Yates Sterling.
U. S. S. Despatch	W. S. Cowles.
U. S. S. Enterprise	B. H. McCalla.
U. S. S. Franklin	B. S. Richards.
U. S. S. Galena	C. M. Chester.
U. S. C. S. Gedney	J. M. Helm.
U. S. R. S. Independence	J. W. Philip.
U. S. S. Lancaster	T. F. Kane.
U. S. S. Michigan	H. F. Picking.
U. S. S. Minnesota	G. C. Wiltse.
U. S. S. Monongahela	W. E. Gibson.
U. S. S. New Hampshire	F. J. Higginson.
U. S. S. Ossipee	W. B. Hoff.
U. S. S. Quinnebaugh	C. H. Davis.
U. S. S. Ranger	F. A. Cook.
U. S. S. Richmond	Robert Boyd.
U. S. R. S. St. Louis	Wm. Whitehead.
U. S. S. Wabash	C. C. Carpenter.
U. S. S. Yantic	O. F. Heyerman.
Sailing vessels.	
Am. bg. Abbie Clifford	D. W. Storer.
Br. bk. Abyssinian	H. Hughes.
Am. bk. Alice	W. G. Kair.
schr. Anna E. Krans	F. H. Perven
bkt. Bonny Doon	Chas. Burgess.
Br. sp. British Merchant	R. J. Maloney.
sp. British Yeoman	R. White.
Ger. bk. Chas. Luling	C. Wicke.
bk. China	T. Selberg.
Am. schr. City of Baltimore	L. S. Tawes.
bk. Cresent	N. S. Bartlett.
E. B. Sutton	C. O. Carter.
Pilot boat E. C. Knight	J. F. Springer.
Am. bk. Edith	Wm. Foster.
Br. bk. Elcho	P. A. Oxelgren.
Am. bk. Freeda A. Wiley	F. A. Watts.
Am. Fluorine	W. Anderson.
Am. bg. H. B. Hussey	G. B. Hodgdon.
H. C. Sibley	G. W. Hichborn.
schr. Henry A. Taber	C. J. Slocum.
bk. Hermon	G. Olsen.
Br. sp. Houghton Tower	Geo. Scott.
Swed. bk. Hudiksvall	T. S. Byland.
Port. bk. Industria	
Br. bk. Iodine	Adam Smith.
Am. sp. J. I. Smith	J. B. Trugley.
schr. John C. Gregory	O. J. Bowers.
bk. Kennard	J. H. Bettencourt.
schr. Kensett	James A. Smith.
bk. L. F. Munson	F. McKowen.
sp. Light-ship No. 37	Andrew Jackson.
bg. Lilian	H. F. Schive.
bkt. Lizzie Carter	E. H. Goodman.
bk. Louise	M. Knudson.
Br. ssp. Mable Taylor	Chas. E. Durkee.
Am. bg. Mary Fink	D. B. Darrah.
schr. Maud H. Dudley	A. L. Cummings.
schr. Messenger	J. Falke.
Ger bk. Nanny	C. Wilhelmj.
Am. shr. Navarino	J. W. Cole.
bk. Neptune	J. Fred. Hill.
Nor. Nor	O. H. Bjorness.
Br. bk. Norman	Wm. Burnley.
Am. schr. Phœbe	M. Medero.
Br. bk. Salina	John Peterson.
Am. Sarah	L. R. Hale.
Br. sp. Servia	E. M. Smith.
Ger. sp. Shakspere	Carl Muller.
Br. bk. Sodium	Wm. Manson.
Am. sp. Tam O'Shanter	Thos. Peabody.
Am. bk. Thomas Brooks	F. J. Johnson.
Br. Valona	H. Andrews.
Am. bkt. Victoria	T. G. Hammond.
Br. bk. Yuba	T. D. McKenzie.
Am. Xenia	N. E. Reynolds.

UNITED STATES SIGNAL SERVICE

MONTHLY WEATHER REVIEW.

VOL. XVI. WASHINGTON CITY, SEPTEMBER, 1888. No. 9.

INTRODUCTION.

This REVIEW treats generally the meteorological conditions of the United States and Canada for September, 1888, and is based upon reports of regular and voluntary observers of both countries.

On chart i the paths of the centres of nine areas of low pressure are shown; the average number for September during the last fifteen years being 9.3.

Descriptions of the storms that occurred over the north Atlantic Ocean are also given, and their approximate paths shown on chart i, on which also appear the distribution of icebergs and the limits of fog-belts west of the fortieth meridian.

The West Indian hurricane of the 1st–7th, and the severe storm which occurred over mid-ocean during the first half of the third decade of the month, together with the heavy rains and gales in the south Atlantic and east Gulf states from the 7th to the 10th, inclusive, constituted noteworthy meteorological features for September, 1888. Fog was less frequently encountered along the trans-Atlantic routes than in the preceding month, and the eastern limit of the Arctic ice-field was largely contracted when compared with the average for corresponding months of previous years.

The distribution of mean temperature is shown on chart ii by dotted isothermal lines.

The month was warmer than the average September over the western part of the country, the maximum temperatures being the highest recorded in the Saskatchewan and middle Sacramento valleys, and in portions of the extreme northwestern states and territories. Over the eastern part of the United States the mean temperature was below the normal, and in states lying south of the Great Lakes and the Saint Lawrence River the minima fell below those of previous years.

The distribution of rainfall for September, 1888, is exhibited on chart iv, and the normal precipitation for eighteen years is shown on chart v.

The rainfall was deficient over a greater part of the country west of the Alantic coast states. In the south Atlantic and east Gulf states the abnormally heavy rainfalls of the early portion of the month occasioned destructive freshets and caused considerable damage to crops.

Chart vi shows lines of equal annual depth of evaporation, in inches, based upon observations taken from July, 1887, to June, 1888, inclusive.

Commencing with July, 1888, the meteorological means for stations of the Signal Service have been determined from two daily observations taken at 8 a. m. and 8 p. m. (75th meridian time). These hours of observation have been permanently adopted, to supersede the former system of tri-daily observations taken at eight-hour intervals.

In the preparation of this REVIEW the following data, received up to October 20, 1888, have been used: the regular bi-daily weather-charts, containing data of simultaneous observations taken at 133 Signal Service stations and 19 Canadian stations, as telegraphed to this office; 178 monthly journals and 185 monthly means from the former and 19 monthly means from the latter; 364 monthly registers from voluntary observers; 71 monthly registers from United States Army post surgeons; marine records; international simultaneous observations; marine reports through the co-operation of the Hydrographic Office, United States Navy, and the "New York Herald Weather Service;" monthly weather reports from the local weather services of Alabama, Arkansas, Illinois, Indiana, Iowa, Kansas, Kentucky, Michigan, Minnesota, Mississippi, Missouri, Nebraska, New England, New Jersey, New York, North Carolina, Ohio, Pennsylvania, South Carolina, and Tennessee, and the Central Pacific Railway Company; trustworthy newspaper extracts, and special reports.

ATMOSPHERIC PRESSURE (expressed in inches and hundredths).

The distribution of mean atmospheric pressure for September, 1888, as determined from observations taken daily at 8 a. m. and 8 p. m. (75th meridian time), is shown on chart ii by isobarometric lines. On July 1, 1888, the tri-daily observations of the Signal Service were superseded by observations taken bi-daily at the hours named. A protracted series of hourly observations has shown that the difference between the mean pressure obtained from two observations taken at these hours and that determined from tri-daily observations, taken at eight-hour intervals, is so small as to be practically inappreciable.

The mean pressure for September, 1888, was highest over the central and east-central portions of the country, where it rose, in localities, above 30.10, and reached a maximum of 30.12 at Lamar, Mo. The area of lowest mean pressure occupied the lower Colorado valley, where the values fell to 29.76 at Yuma, Ariz. The barometric gradients were steep over the extreme west-central and southwest districts, notably in northern California and southern Arizona; elsewhere they were gentle.

As compared with the pressure chart for August, 1888, a general increase is shown, except over the south Atlantic and east Gulf states, in the middle Saskatchewan valley, and along the Pacific coast. The greatest increase has occurred over eastern New England and the Canadian Maritime Provinces where it exceeds .15 inch, and in the middle Missouri valley and over portions of the middle and southern slope of the Rocky Mountains where it is more than .10 inch. In the regions of decrease the changes have been small, except over Florida where they exceed .05 inch.

As compared with the normal pressure for September, the mean barometer readings for the current month were above the

normal over New England, the Canadian Maritime Provinces (except over the western extremity of Nova Scotia), along the Saint Lawrence Valley, and, generally, over the Great Lakes and over the entire central portion of the country; the greatest departures occurring in the upper Missouri valley and over the northern and middle slopes of the Rocky Mountains, where they varied from .06 to .10 inch. The mean pressure was deficient along the Atlantic coast south of New England, and in all states lying south of the Ohio and east of the Mississippi rivers, and in Louisiana. It was also below the normal over the extreme western part of the country from British Columbia to Mexico. The greatest departures below the normal occurred in the middle Sacramento valley, where they amounted to .10 inch, and along the middle Atlantic coast, where they were more than .05 inch.

BAROMETRIC RANGES.

The monthly barometric ranges at the various Signal Service stations are also given in the table of miscellaneous meteorological data. The ranges conform to the general rule, that is they increase with the latitude and decrease slightly, though somewhat irregularly, with increasing longitude. Along the Atlantic coast the extreme ranges varied from .42 at Key West and .41 at Sanford, Fla., to 1.53 at Nantucket, Mass., and 1.50 at Eastport, Me.; between the eighty-second and ninety-second meridians, .43 at Pensacola, Fla., to 1.03 at Alpena, Mich.; between the Mississippi River and Rocky Mountains, .29 at Brownsville, Tex., to .89 at Saint Vincent, Minn.; in the plateau and Rocky Mountain regions, .37 at Yuma, Ariz., to 1.02 at Fort Assinaboine, Mont.; on the Pacific coast, .33 at San Diego, Cal., to .74 at Port Angeles, Wash.

AREAS OF HIGH PRESSURE.

Eight areas of high pressure were observed during the month of September, five of which originated to the east of the Rocky Mountains and passed eastward to the Atlantic coast, the remaining three being first observed on the north Pacific coast and disappearing in the Rocky Mountain region or to the north of Manitoba. The movement of the high areas on the Pacific coast was first to the north of east and, after passing the coast line, to the southeast, until they finally disappeared in the central Rocky Mountain region or changed direction to the north of east after reaching the one hundred and tenth meridian. Three of these areas apparently developed over the central Rocky Mountain slope or in the central valleys, each of which moved northeastward over the Lake region, after which the direction changed to the south of east and they crossed the Saint Lawrence Valley and northern New England and disappeared to the east of Nova Scotia.

The following table shows the approximate latitude and longitude in which the centre of each area of high pressure was first and last observed, the highest observed barometer reading attending each, and the average rate of movement in miles per hour:

Number of area.	First observed.		Last observed.		Highest observed barometer reading.	Average hourly velocity.
	Lat. N.	Long. W.	Lat. N.	Long. W.		
	° ′	° ′	° ′	° ′	*Inches.*	*Miles.*
I	39 00	103 00	44 00	59 00	30.32	34.7
II	41 00	103 00	41 00	61 00	30.68	25.0
III	51 00	99 00	43 00	61 00	30.40	21.3
IV	46 00	122 00	50 00	94 00	30.36	18.8
V	46 00	123 00	36 00	105 00	30.32	16.7
VI	43 00	90 00	43 00	70 00	30.42	13.9
VII	42 00	127 00	42 00	104 00	30.60	17.7
VIII	51 00	112 00	34 00	87 00	30.54	20.8

Average rate of progress, 21.1 miles per hour.

I.—On the morning of September 1st areas of low pressure were observed on the New England coast, in the lower Mississippi valley, and to the north of Lake Superior, while the pressure was high over the Missouri Valley and central Rocky Mountain region. The succeeding twenty-four hours showed a slight easterly movement of the area of high pressure over the central valleys, and during the 2d the easterly movement was more rapid, carrying the centre of greatest pressure to the Saint Lawrence Valley. It passed over northern New England, and the maximum pressure, 30.32, occurred on the morning of the 4th at Sydney, N. S., after the centre had apparently passed to the eastward of that station.

II.—Number ii appeared over the eastern slope of the Rocky Mountains on the 4th, when the preceding area of high pressure was passing off the North Carolina coast; it moved over the same general course followed by number i, extending over the upper lake region on the 5th, and over the Saint Lawrence Valley on the 6th, where the direction of movement changed to the southeast. Although the general direction of movement of this high area was almost identical with that of number i both as to direction and rate of movement, the latter was more clearly defined, owing to the rapid increase of pressure during the easterly movement. When first observed it was bounded by an isobar of 30.2, and when last observed central over New England the pressure had increased to 30.68. The usual fair weather attending areas of high pressure prevailed over the Northern States and central valleys during the greater part of the period from the 1st to 8th, and damaging frosts occurred in New England on the 6th and 7th while high area number ii covered that region. The northeasterly winds in the Southern States attending the transit of these areas were generally accompanied by cool, threatening weather and rain during the period named. The rains in the Southern States were also partially due to the tropical storm passing to the south of the stations of observation, the distribution of pressure tending to keep the winds within the rain quadrants.

III.—This area of high pressure appeared to the northward of Manitoba on the afternoon of the 11th, and after passing almost directly to the southward of Iowa during the succeeding twenty-four hours, it changed direction to the eastward, and by the afternoon of the 14th it was central off the middle Atlantic coast. It was attended by killing frosts in portions of Michigan and Wisconsin, and light frosts in the Ohio Valley on the 13th. The frosts in the tobacco and cranberry regions of Wisconsin caused some damage to these crops. A warning was telegraphed from this office on the evening previous to the occurrence of these frosts, but owing to imperfect telegraphic facilities the dispatches were not received by interested parties in time to enable them to take advantage of the warnings. Light frosts also occurred in portions of New England and the middle Atlantic states during the passage of this area of high pressure. After reaching the middle Atlantic coast this high area apparently extended in north and south directions, the centre passing to the New England coast and thence eastward, being last located to the southeastward of Nova Scotia on the 16th. The maximum barometric pressure observed within the limits of this high area, 30.40, occurred at Huron, Dak., on the morning of the 12th, when the centre was near that station, this reading being .10 higher than the pressure at the centre of the area when it was last observed.

IV.—Number iv apparently formed on the north Pacific coast on the 13th, during which date it passed from the southern to the northern portions of Washington Territory. The pressure increased rapidly during the succeeding twenty-four hours as it passed southeastward, covering the Rocky Mountain regions during the 14th and morning of the 15th, the maximum pressure, 30.36, occurring at Cheyenne, Wyo., on the morning of the 15th, when the area was elliptical in form and was bounded by isobars of 30.3, 30.2, and 30.1, extending from Montana and Idaho southward to Texas and New Mexico. The succeeding reports indicate that portions of this area of high pressure moved northeastward, attended by decreasing pressure at the centre, and it probably disappeared to the north of Minnesota, or formed a part of the more extended area of high pressure which covered the Hudson Bay region and lower Saint Lawrence valley on the 17th.

V.—Number v appeared off the Pacific coast west of Oregon

on the morning of the 18th. It passed directly eastward over the northern plateau region and thence southeastward over the central Rocky Mountain region, where it disappeared on the 21st by a gradual decrease of pressure, and without causing marked disturbances, although light rains occurred generally at Rocky Mountain stations after the winds shifted to northerly, and during the increase of pressure attending this area. The maximum pressure, 30.32, occurred at Cheyenne, Wyo., on the morning of the 20th.

VI.—This area of high pressure formed in the upper Mississippi valley on the 20th, when the preceding area covered the Rocky Mountain region, the two areas of high pressure being separated by a trough of low pressure covering the Missouri Valley. It moved slowly northeastward and was apparently re-enforced from the Hudson Bay region, the barometer reaching its maximum, 30.42, at LaCrosse, Wis., on the morning of the 23d. It remained almost stationary from the 20th to 23d, after which it moved eastward to the New England coast, the pressure decreasing from 30.42 to 30.20 during the easterly movement, and it disappeared rapidly on the 25th, in advance of the tropical storm which was then moving along the Atlantic coast.

VII.—This area of high pressure was observed on the 21st to the west of northern California, and moved slowly northeastward until the afternoon of the 23d, when it was central in northwestern Washington Territory. It moved rapidly eastward over the northern plateau region, the pressure attaining its maximum, 30.60, in western Montana on the 24th, after which it apparently extended southward, covering the eastern Rocky Mountain slope, but disappearing by a decrease of pressure before reaching the central valleys.

VIII.—The preceding area was followed quickly by the appearance of a second area of high pressure to the north of Montana, while number vii extended over the central Rocky Mountain region. The high area northward of Montana moved southeastward, covering the eastern slope of the Rocky Mountains on the morning of the 27th. The succeeding twenty-four hours shows than this area drifted to the eastward, covering the central valleys, from the Gulf to Manitoba, the maximum pressure observed being 30.54 at Cheyenne, Wyo., although the general circulation of the winds indicated that the centre of this high area was in the lower Missouri valley. Killing frosts occurred throughout the Northwest on the 29th, and light frosts in the Ohio Valley and northern portions of the Gulf and south Atlantic states on the 30th. After reaching the central valleys this area apparently drifted to the southeastward, passing over the Southern States, where it remained at the close of the month.

AREAS OF LOW PRESSURE.

The following table shows the latitude and longitude in which each area of low pressure was first and last observed, the lowest pressure observed within each area, and the average velocity in miles per hour:

Number of area.	First observed.		Last observed.		Lowest observed barometer reading.	Average velocity per hour.
	Lat. N.	Long. W.	Lat. N.	Long. W.		
	° ′	° ′	° ′	° ′	*Inches.*	*Miles.*
I	42 00	72 00	44 00	67 00	29.74	25.0
II	52 00	114 00	51 00	64 00	29.60	28.6
III	53 00	115 00	52 00	77 00	29.48	16.7
IV	26 00	80 00	51 00	59 00	29.50	16.0
V	53 00	114 00	51 00	59 00	29.46	25.0
VI	40 00	89 00	45 00	87 00	29.64	5.6
VII	27 00	79 00	50 00	65 00	29.08	33.3
VIII	54 00	107 00	49 00	66 00	29.42	30.6
IX	52 00	98 00	48 00	91 00	29.46	36.7

Average rate of progress, 24.2 miles per hour.

Nine areas of low pressure were observed within or near the stations of observation during the month of September. This number, however, does not include the West Indies hurricane which passed over Cuba and the southern portion of the Gulf of Mexico during the earlier part of the month, and which is described as number i under the heading "North Atlantic storms." It will be seen from chart i that the mean track of the areas of low pressure traced for this month was to the eastward generally to the north of the stations of observation, while two disturbances were traced along the Atlantic coast from Florida to the lower Saint Lawrence valley.

The following are general descriptions of the weather conditions attending each area of low pressure:

I.—The month opened with an area of low pressure of slight energy central over New England and an area of high pressure covering the eastern slope of the Rocky Mountains and the central valleys. This disturbance moved northeastward, causing heavy rains in northern New England on the 1st, and it apparently disappeared over the Maritime Provinces by a gradual increase of pressure. The lowest barometer reading observed was 29.74, at Manchester, N. H., on the 1st.

II.—Area of low pressure number ii appeared to the north of Montana on the afternoon of the 1st, the pressure being low over the plateau region from British Columbia southward to Arizona. This disturbance moved directly eastward, following the general course of the fiftieth parallel of latitude, the pressure at the centre apparently increasing until the disturbance passed eastward of the Lake region, after which the pressure declined slightly and the area apparently extended. Although this disturbance caused no marked change in the weather conditions its movement eastward could be traced from the weather charts from the 1st until the morning of the 5th when it was central north of the Gulf of Saint Lawrence. The minimum pressure observed was 29.60 at Calgary, Northwest Territory, on the 1st.

III.—This area of low pressure appeared on the afternoon of the 5th in the same region where the preceding area was first observed, and was attended by similar distribution of pressure over the western portion of the continent. The barometric trough extended from British Columbia southward over the plateau regions, and the pressure was high over the eastern slope of the Rocky Mountains and in the central valleys. These conditions drifted to the eastward during the succeeding twenty-four hours, the barometric trough covering the Rocky Mountain regions and the centre of disturbance moving southeastward to western Dakota, the barometric pressure, however, increasing within the centre about .20. After reaching Dakota on the afternoon of the 5th the storm apparently moved to the northeastward, attended by light rain in its southern quadrants, which covered the Northwest and upper lake region. When this disturbance changed its course to the northeast in Dakota on the 5th, a severe tropical storm was passing westward over the southern portion of the Gulf of Mexico. The northeasterly movement of this storm continued until the 7th, when its course changed to the eastward, the centre being approximately located far to the north of the Lake region during the 7th and 8th, and it disappeared to the east of Hudson Bay on the 9th. The westerly winds following this storm attained maximum velocities of thirty-five miles per hour on Lakes Huron and Michigan. The lowest observed pressure was 29.48 at Calgary, Northwest Territory, on the 4th.

IV.—This was a well defined tropical storm which was first observed near Point Jupiter, Fla., on the afternoon of the 7th; it moved slowly northwestward, recurving near latitude 30° in the vicinity of Cedar Keys, Fla. during the night of the 8th, attended by violent winds on the east and west Florida coasts, the wind attaining a maximum velocity of sixty miles per hour at Cedar Keys, where the barometer fell to 29.50. The centre of this storm moved to the east of north over the south Atlantic states, attended by very heavy rains and dangerous gales along the coast. At the afternoon report of the 10th it was central near Norfolk, Va., after which it followed the middle Atlantic and New England coasts, causing dangerous gales as far north as Boston. After reaching the southern New England coast it moved directly northward to the Saint Lawrence

Valley, forming a junction with the low area traced as number v, after which the single disturbance moved northeastward with an apparent loss of energy and disappeared to the northeastward on the 14th. The lowest pressure observed was that noted at Cedar Keys, Fla., on the afternoon of the 8th.

V.—Number v originated north of Montana on the 8th when the general distribution of pressure was similar as described in the cases of low areas numbers ii and iii, and it followed a corresponding path to the eastward, nearly coincident with the fiftieth parallel, inclining first to the south of east, and causing secondary depressions of slight energy to form in the Northwest and Rocky Mountain regions, while the centre of the principal disturbance remained to the north of the stations of observation. It passed north of the Lake region during the 11th and apparently attained its maximum energy when the centre was north of Lake Superior. When the disturbance approached the Saint Lawrence Valley it was apparently drawn toward the tropical storm which was then moving along the Atlantic coast, and the two storms united, as previously stated, when near Quebec. The angle made by the direction of these tracks previous to their union was about 70°, and the direction of movement after the union was approximately a continuation of the path of the tropical storm. Each storm was deflected from its course as the centres approached the point of union. The lowest barometer reading observed during the passage of number v was 29.46 at Medicine Hat, Northwest Territory, on the afternoon of the 9th.

VI.—This disturbance developed in the central Mississippi valley on the 15th within an extended barometric trough which resulted from an area of low pressure which was first observed over the plateau regions on the 11th. The early movements of this depression were not traced, owing to the uncertainty as to the positions of its centre. A barometric disturbance formed on the 12th to the north of Montana and moved eastward to the north of the stations of observation, in a manner similar to that described in low areas numbers ii, iii, and v. Secondary disturbances formed in the Missouri Valley on the 13th, which were attended by high northerly winds in the states and territories of the Missouri Valley. After the barometric trough reached the central valleys on the 15th the pressure apparently increased at the northerly stations and a secondary disturbance formed to the southward, which has been traced as number vi. Heavy rains occurred from the Gulf States northward over the Lake region, and during the first twelve hours the direction of movement of this area of low pressure was to the northeast from Illinois to Michigan, after which it apparently moved slowly westward for thirty-six hours, carrying the centre of disturbance to the southern portion of Wisconsin, from which point it moved slowly northward and disappeared by an increase of pressure during the afternoon of the 18th. An examination of the weather charts shows that there was a well-defined movement of this disturbance to the westward on the 16th and 17th. A minimum pressure of 29.64 was observed at Grand Haven, Mich., on the 16th.

VII.—The marine reports received at this office indicate that this storm originated east of and near the Florida coast on the 24th. It moved rapidly northward, passing from the latitude of northern Florida to southern New England in twenty-four hours. Reports received from Hatteras, N. C., indicate that the centre passed to the east of, and near, that station on the afternoon of the 25th, while on the morning of the 26th the centre had reached the vicinity of Nantucket, where dangerous gales were reported, the wind reaching a velocity of 60 miles northeast at Block Island, and 50 miles southeast at Nantucket, Mass. On the southern New England coast the barometer fell .78 in twelve hours, and reached a minimum of 29.08 at Nantucket on the morning of the 26th. By 8 p. m. of that date the centre had reached the vicinity of Eastport, Me., and the wind attained a maximum velocity of 60 miles per hour at both Boston and Eastport during that day. It will be seen from the table of velocities, etc., that this storm moved at an unusually rapid rate, and it probably passed beyond the stations northeast of New England during the 27th.

VIII.—This storm appeared in the region to the north of Montana on the 25th and moved southeastward during the next forty-eight hours, reaching the vicinity of Lake Huron where it attained its maximum energy, being attended by brisk to high westerly winds throughout the Lake region. At this point the course changed in the direction of the Saint Lawrence Valley, the centre of disturbance extending rapidly and the pressure increasing with the easterly movement. It was last marked central in the vicinity of Father Point, Quebec, on the morning of the 28th. The lowest barometer reading, 29.42, was observed at Sault Ste. Marie, Mich., on the morning of the 26th.

IX.—This storm was central north of Manitoba on the morning of the 30th and it moved rapidly southeastward, the centre reaching the western portion of Lake Superior by 8 p. m. of that date, attended by general rains throughout the Lake region. The rapid fall of the barometer during the last twelve hours on the 30th indicated that this storm would increase rapidly in energy and cause severe gales on the lakes. While the morning report of the 30th did not justify the ordering of cautionary signals for the upper lake region, the conditions were sufficiently threatening to cause special reports to be called for, which were received in time to enable the central office at Washington to order cautionary signals several hours before the storm. The lowest barometer reading that had been observed before the close of the month was 29.46 at Marquette, Mich., in the afternoon.

NORTH ATLANTIC STORMS FOR SEPTEMBER, 1888.

[*Pressure in inches and millimetres; wind-force by Beaufort scale.*]

The paths of the depressions that appeared over the north Atlantic Ocean during September, 1888, have been determined from international simultaneous observations by captains of ocean steamships and sailing vessels, received through the co-operation of the Hydrographic Office, Navy Department, and the "New York Herald Weather Service."

Nine depressions have been traced, of which three advanced eastward from the American coast north of the fiftieth parallel; five apparently developed over mid-ocean, and one originated in the vicinity of the West Indies. One storm, which appeared over the Bahama Islands on the 6th and from thence moved north of west into the Gulf of Mexico, is traced and described as a land low area. The depressions whose paths are plotted in high latitudes generally pursued normal east-northeast tracks; over mid-ocean south of the fiftieth parallel the progressive movements of the storms were irregular, while over the southern portion of the ocean the anomalous course of depression number 1 is an especially noteworthy feature.

In September, 1887, nine depressions were traced, of which five were of tropical or sub-tropical origin; three advanced eastward from the American continent north of the forty-fifth parallel, and one first appeared over the British Isles. The storms were generally deficient in energy, and while the depressions of tropical origin somewhat exceeded the average for the month, there was a corresponding decrease in the number that passed eastward near Newfoundland, and an almost entire absence of storms of pronounced strength in high latitudes east of the fortieth meridian.

In September, 1888, the disastrous hurricane which traversed the West Indies and the Gulf of Mexico from the 1st to the 7th, inclusive, and the severe storms which attended the presence of depressions located, respectively, over mid-ocean and

off the coast of the United States during the last decade, constituted the more noteworthy meteorological features of the month. The weather in the trans-Atlantic tracks east of the fiftieth meridian continued generally fine until the 21st, after which there was a succession of severe gales. In the vicinity of the American coast south of the forty-fifth parallel settled weather prevailed, except during portions of the first and third decades.

In the following descriptions of the depressions traced positions are given in degrees of latitude and longitude, except in cases where from twenty-five to thirty-five minutes have been cited, when they are shown in degrees and half degrees.

1.—This storm was remarkable both on account of its exceptional energy and by reason of the abnormal path it pursued after having advanced to the westward of the eightieth meridian. The first information relative to its advance was communicated by Captain Edwards, of the s. s. "Jamaican," who experienced a violent hurricane on the 31st of August, one hundred and fifty miles northeast of Sombrero Island, and who calculated that its vortex had passed one hundred and twenty miles north of the Virgin Islands on a north by west course, or between west and west by north, and estimated its diameter at five hundred miles. At noon (Greenwich time) of September 1st the hurricane centre was apparently located north of the western extremity of Puerto Rico. On the 2d a hurricane devastated Turks Islands, where the minimum pressure, 28.95 (735.3), was noted at about 5 p. m. (Greenwich time). Twenty-one lives were lost; more than two hundred and fifty houses of the peasantry and over 400,000 bushels of salt were entirely destroyed, and nearly every house left standing was more or less damaged. In the morning the weather was threatening, with falling barometer and northeast wind; subsequent to the passage of the storm-centre the wind shifted to southerly and the barometer rose rapidly. By noon (Greenwich time) of the 3d the centre had moved to the northward of Great Inagua Island, in which locality the barometer fell to about 28.70 (729.0). On this date the wind at Santiago de Cuba began at northwest and backed to southwest, and at 5 p. m. was from south-southwest, blowing fresh. At Boca de Sagua the barometer fell, with heavily clouded and rainy horizon and northerly squalls. At Santa Clara the barometer fell during the afternoon and evening to 29.38 (746.2) at 11 p. m. At 5 p. m. heavy rain was falling in the first, and one point of the second, quadrant, which changed into a short vigorous rain from north-northwest, with strong squalls from the same direction. The sky then cleared somewhat up to 10 p. m., at which hour the rain-squalls came again in greater strength from the same direction as before, flying around to east-southeast, and although of short duration, covered the first two quadrants and left the wind at south-southwest. The cyclone affected the barometer in Jamaica on the 3d, and the upper cloud-drift was west. At noon (Greenwich time) of the 4th the centre had arrived off the Cuban coast somewhat to the eastward of Sagua, where the barometer fell to 28.90 (734.0) at 9.10 a. m., and the wind attained a velocity of one hundred and twenty miles an hour.

During this and the early part of the following date the depression moved westward over Cuba, and passed somewhat to the southward of Havana at about 2 a. m. of the 5th, where the minimum pressure was 29.20 (741.7), and the wind reached a velocity of ninety miles an hour. Advancing in a south of west course the centre left the western extremity of the island during the 5th. Attending the passage of the storm-centre over Cuba the losses by destruction of property and crops amounted to millions of dollars, and about eight hundred lives were lost. The principal buildings of the large cities were demolished, and whole towns situated near the seaboard were entirely destroyed by the gigantic waves that swept inland. After leaving Cuba the vortex apparently moved in a nearly west-southwest direction over or off the northern coast of Yucatan, and reached the Mexican coast between Vera Cruz and Coatzacoalcos during the night of the 7–8th, where it exhibited great strength and occasioned considerable damage to property and shipping.

The paths of storms of this class hitherto plotted have trended to the north of west, and finally recurved to the northward or northeastward, their course subsequent to the recurvature generally causing the paths to describe a parabolic curve. The movement of the vortex of this storm after the 4th presented a marked departure from the general meteorological laws which govern the movements of West Indian hurricanes which can only be accounted for by the supposition that there existed abnormal atmospheric conditions whereby the deviation from a practically fixed law was occasioned.

Assuming that these conditions would be apparent attending the advance of the cyclone previous to, and accompanying, the southward deflection of its path, it would appear that a study of the general atmospheric movements and conditions over the North American continent and adjacent waters during the prevalence of this and other storms of the same type would materially aid in determining the nature of the disturbing causes which existed during the advance of the cyclone under consideration. It is known that areas of high barometer will deflect or retard storms when situated in their line of advance. In the present instance an area of unusually high barometer swept eastward over the United States from the 4th to the 6th, inclusive, and was preceded by an area of high which advanced eastward over Nova Scotia during the 4th. It is further shown that, owing to the abnormally high barometer readings within the second of the areas of high pressure referred to, an unusually steep gradient existed from the West Indies northward. Admitting that the steepness of this gradient would largely contribute to prevent the storm-vortex from making the usual recurve to the northward, it remains to consider, so far as reports will permit, any additional marked meteorological phenomena which appeared during that period. On the 6th and 7th a cyclonic area of moderate energy, which had followed a general course similar to the one which reached Cuba on the 4th, was central over the Bahama Islands. As regards the possible influence that this storm may have exerted in causing the abnormal southerly movement of its predecessor, it may be stated that, in the several instances noted in which storms of this class have closely followed one another, this result has not been shown. An important feature is presented in reliable advices from Jamaica, to the effect that while the large cyclone was passing north of Cuba a very shallow barometric depression crossed Jamaica September 3d. It moved west-northwest at the rate of fifteen miles an hour, and passed the centre of the island at 2 p. m., and it is thought that after it left Jamaica it developed into a cyclone. A reference to the foregoing report from Santa Clara, will show that the wind-directions at that place were evidently influenced by this depression at about 10 p. m. of the 3d.

As cyclonic depressions not infrequently unite and form one system, which fact would seem to indicate that they possess an attraction for others of their kind, it is not unreasonable to suppose that, attending the advance and subsequent strong development of a cyclone to the south and west of the principal storm herein considered, an influence was exerted, which, taken in connection with the very marked barometric gradient to the northward, may have occasioned the anomalous course of this remarkable hurricane.

2.—This depression passed northeast from the Gulf of Saint Lawrence, and at noon, Greenwich time, of the 3d was central in about N. 55°, W. 49°, whence it moved east-northeast, and disappeared north of the British Isles after the 6th, attended throughout by moderate to fresh gales.

3.—This depression is given a probable track over mid-ocean north of the fifty-fifth parallel during the 10th and 11th, on which dates fresh to strong gales occurred in that region. Subsequent to the 11th the storm-centre apparently moved to the vicinity of Iceland.

4.—This depression first appeared in N. 50°, W. 39° on the 11th, whence it had advanced from northeast of Newfoundland.

On this date fresh to strong gales prevailed along the trans-Atlantic tracks between the thirtieth and fiftieth meridians. By the 12th the cyclone centre had moved slightly to the southeastward of its former position, with minimum pressure about 28.80 (731.5) and strong to whole gales. From this position the storm passed northeast, with an appreciable loss of energy, and disappeared north of the region of observation after the 13th.

5.—This depression moved northeast from the Gulf of Saint Lawrence, and on the 14th was central in about N. 54°, W. 50°, from whence it passed slowly east-northeast and disappeared north of the fifty-fifth parallel after the 15th, without evidence of marked energy.

6.—This was a depression of moderate strength which moved from off the southern extremity of Greenland, where it was central on the 17th, southeastward over mid-ocean, where it apparently united with depression number 7 after the 20th. The abnormal course of this storm was evidently due to the presence over the ocean to the eastward of an area of high barometric pressure, whereby it was deflected to the southward. Its subsequent recurve to the southwest was occasioned by the advance from that quarter of the important storm traced as number 7.

7.—This was the most important depression that appeared in the vicinity of the trans-Atlantic tracks during the month, and during the period of its prevalence over mid-ocean, where it remained nearly stationary from the 21st to the 26th, inclusive, strong to whole gales attaining hurricane force, and very low barometric pressure, were reported. Reports at hand will not admit of determining the causes which would seem to occasion the almost stationary position of the centre of this storm during the period referred to further than showing that the barometric pressure over, and to the eastward of, the British Isles was high and slowly falling from the 21st to the 26th, and that subsequent to the latter date, and attending the northeast movement of the depression, this area of high gave way and was superseded by low pressure and cyclonic winds.

8.—This was a depression of moderate energy which apparently originated over mid-ocean northwest of the Azores on the 28th, and from thence moved eastward over the Bay of Biscay, where it disappeared after the 29th.

9.—This depression was central on the 29th midway between the Azores and the Banks of Newfoundland, and during that and the following date moved slowly eastward to the thirty-third meridian, without evidence of marked energy.

OCEAN ICE.

The following table shows the southern and eastern limits of the region within which icebergs or field-ice were reported for September during the last six years:

Southern limit.			Eastern limit.		
Month.	Lat. N.	Long. W.	Month.	Lat. N.	Long. W.
	° ′	° ′		° ′	° ′
September, 1883.....	48 25	47 10	September, 1883.....	49 01	44 33
September, 1884.....	46 06	53 21	September, 1884.....	47 39	49 14
September, 1885.....	45 40	48 22	September, 1885.....	48 40	46 27
September, 1886.....	46 40	53 00	September, 1886.....	48 00	48 40
September, 1887.....	45 37	49 50	September, 1887.....	45 37	49 50
September, 1888.....	Off Cape	Race	September, 1888.....	53 00	52 08

On chart i the following positions of icebergs observed during September, 1888, are shown by ruled shading:

7th.—S. S. "Lake Winnipeg," off Belle Isle, a berg.

8th.—S. S. "Glendale," N. 51° 45′, W. 55° 20′, a medium sized berg.

12th.—S. S. "Vancouver," N. 53° 00′, W. 52° 08′, a very large berg.

13th.—S. S. "Lake Superior," in Belle Isle Strait, one berg and a quantity of small ice; s. s. "Glendale," N. 49° 49°, W. 54° 40°, a small berg.

15th.—S. S. "Colina," off Point Amour, a large berg.

20th.—S. S. "Devonia," 28 miles southeast from Cape Race, a large berg, very high and evidently aground; s. s. "Glendale," in Belle Isle Strait, a small berg.

26th.—S. S. "Glendale," near Belle Isle, a medium sized berg.

28th.—S. S. "Parisian," off Belle Isle, a large berg.

29th.—S. S. "Sarnia," entrance to Belle Isle Strait, a large berg.

30th—S. S. "Wandrahm," off Belle Isle, a large berg.

Ice was reported south of the fiftieth parallel on two dates only. In the Straits of Belle Isle and off the extreme northern coast of Newfoundland icebergs were observed on ten dates.

In August, 1888, no icebergs were reported save in the Straits of Belle Isle and off the extreme northern coast of Newfoundland, where their presence was noted on fourteen days.

The September ice reports for the last five years show that the average southern limit of Arctic ice for this month is in about N. 46° 30′, and the average eastern limit in about W. 46°. It will therefore be seen that in September, 1888, the southernmost position in which ice was reported corresponded with the average southern limit, while the easternmost ice was encountered about six degrees west of the average eastern limit.

FOG.

The following are the limits of fog-areas on the north Atlantic Ocean during September, 1888, as reported by shipmasters:

Date.	Entered.		Cleared.		Date.	Entered.		Cleared.	
	Lat. N.	Lon. W.	Lat. N.	Lon. W.		Lat. N.	Lon. W.	Lat. N.	Lon. W.
	° ′	° ′	° ′	° ′		° ′	° ′	° ′	° ′
1	40 50	61 15	41 50	61 40	10-11	48 15	45 50	45 10	50 00
1	45 57	45 55	45 42	46 47	11	41 00	60 00	40 59	62 05
1-2	42 40	62 30	42 27	68 10	13	46 00	46 30	45 00	53 00
1-2	40 30	71 20	40 30	70 12	13	40 36	69 04	40 34	69 19
2	40 15	71 45	41 06	65 00	14	44 34	47 43	43 48	50 07
2	43 22	59 50	42 12	63 30	14	51 48	55 00	51 45	55 40
2-3	47 12	43 14	46 22	46 31	14-15	47 21	45 02	46 53	46 23
3	44 30	56 30	44 06	57 55	17	42 16	59 00	42 18	70 45
3	39 55	68 15	39 43	68 30	17-18	41 00	67 15	Off Shinecock.	
3	48 00	42 00	47 08	45 30	17-18	43 33	61 10	43 17	62 14
4	40 35	70 43	40 34	71 27	18	42 17	64 45	40 38	69 26
5	43 01	60 10	42 00	63 20	18-19	41 10	66 09	40 58	67 57
5	38 40	73 56	Off Long Branch.		19	40 50	66 40	40 39	67 42
5	43 52	50 24	44 12	50 32	22	41 00	67 00	41 00	69 00
5-6	47 00	47 23	46 10	50 23	26	44 00	56 00	44 00	57 00
9	43 26	59 30	42 32	61 30	27	45 00	49 00	45 00	51 00
9-10	43 46	61 48	40 43	69 24	28	44 00	58 00	44 00	59 00
10	41 10	66 52	40 02	71 24	28-29	52 00	55 00	52 00	55 00
10	48 00	43 00	47 00	47 00	29-30	52 00	50 00	Belle Isle.	
10	43 35	47 30	44 37	51 50	29-30	46 45	45 00	45 15	50 00

The limits of fog-belts to the westward of the fortieth meridian are shown on chart i by dotted shading. In the vicinity of the Banks of Newfoundland fog was reported on sixteen days, as compared with twenty-six days for August, 1888, and twenty-two days for September, 1887. To the westward of the sixtieth meridian fog was reported for a total of twelve days, as compared with nine days for the preceding month, and four days for September, 1887.

As compared with the charted fog-belts for August, 1888, the limit has contracted nearly two degrees in the vicinity of the fiftieth meridian, while to the westward of the sixtieth meridian it remains approximately the same.

The development of fog over or near the Grand Banks attended the circulation of winds in the eastern or southern quadrants of areas of low barometric pressure which advanced eastward or northeastward from the American continent. To the westward of the sixtieth meridian fog was generally reported attending or immediately following the passage of cyclonic areas.

Fog reports of the last eighteen months show that there has been a marked diminution in the number of fog-areas over and west of the Grand Banks during the successive fall and winter months, and that fog has been less frequent in January and February, after which there is an increase until July and August, when the maximum occurs. This fact may be ascribed to the absolute differences in temperature in these localities, which, on account of the presence of ice fields, are more marked during the spring and summer months.

TEMPERATURE OF THE AIR (expressed in degrees, Fahrenheit).

The distribution of mean temperature for September, 1888, is exhibited on chart ii by dotted isothermal lines. In the table of miscellaneous data the monthly mean temperatures and the departures from the normal are given for stations of the Signal Service. The figures opposite the names of the geographical districts in the columns for mean temperature, precipitation, and departures from the normal show, respectively, the averages for the several districts. The normal for any district may be found by adding the departure to the current mean when the departure is below the normal and subtracting when above. Chart iii exhibits normal and current September temperature curves for selected stations.

The mean temperature was highest in the lower Colorado valley, where a reading of 88°.2 was reported from Yuma, Ariz. Values rising above 80° were also reported in the Sacramento and San Joaquin valleys, and over the southern half of the Florida Peninsula. The lowest mean temperatures occurred in the lower Saint Lawrence valley, where they fell below 50°, and in the extreme northwest part of Washington Territory, where they ranged below 55°.

The mean temperature corresponded with the normal along a line traced in a general southwest direction from northern Minnesota to southern New Mexico. To the westward of this line it was above the normal, the greatest departures occurring over parts of Idaho, Oregon, and Washington Territory, and in the Saskatchewan Valley, where they exceeded 8°. Over the eastern portion of the country the temperature was below the normal, except along the west coast of the Gulf of Saint Lawrence, the deficiencies being greatest over parts of western Pennsylvania and western New York, where they exceeded 6°.

The following are some of the most marked departures from the normal at the older established Signal Service stations:

Above normal.	°	Below normal.	°
Swift Current, N. W. T.	9.3	Pittsburg, Pa.	6.4
Boisé City, Idaho	8.1	Rochester, N. Y.	6.0
Spokane Falls, Wash.	7.6	Grand Haven, Mich	5.8
Helena, Mont	6.6	Columbus, Ohio	5.7
Winnemucca, Nev.	6.6	Lynchburg, Va.	5.6
Salt Lake City, Utah	6.6	Chicago, Ill.	5.2

RANGES OF TEMPERATURE.

The monthly and the greatest and least daily ranges of temperature at Signal Service stations are given in the table of miscellaneous meteorological data. The greatest ranges occurred over Nebraska and thence northward to the British Possessions, in parts of the northern plateau region, and in southwestern Oregon and north-central California, where they exceeded 60°. They were least over southern Florida, where they fell below 20°, and along portions of the California and Texas coasts, where they were less than 30°.

The following are some of the extreme monthly ranges:

Greatest.	°	Least.	°
Valentine, Nebr.	70.2	Key West, Fla.	17.8
Fort Yates, Dak	69.8	Jupiter, Fla	21.6
Fort Buford, Dak.	68.5	Galveston, Tex	21.7
Spokane Falls, Wash	62.2	San Diego, Cal	23.6
Ashland, Oregon	61.9	Eureka, Cal.	26.5
Boisé City, Idaho	60.2	Corpus Christi, Tex	27.5

DEVIATIONS FROM NORMAL TEMPERATURES.

The following table shows for certain stations, as reported by voluntary observers, (1) the normal temperatures for a series of years; (2) the length of record during which the observations have been taken, and from which the normal has been computed; (3) the mean temperature for September, 1888; (4) the departures of the current month from the normal; (5) and the extreme monthly means for September during the periods of observation and the year of occurrence:

State and Station.	County.	(1) Normal for the month of Sept.	(2) Length of record.	(3) Mean for Sept., 1888.	(4) Departure from normal.	(5) Extreme monthly mean temperature for September.			
						Highest.		Lowest.	
						Am't.	Year.	Am't.	Year.
Arkansas.		°	Years	°	°	°		°	
Lead Hill	Boone	72.3	7	68.9	−3.4	76.4	1884	67.5	1883
California.									
Sacramento	Sacramento	66.8	22	68.6	+1.8	72.0	1875	61.7	1871
Connecticut									
Southington	Hartford	61.4	19	59.0	−2.4				
Florida.									
Merritt's Island	Brevard	79.3	5	78.4	−0.9	80.0	1884	78.4	1888
Illinois.									
Aurora	Kane	63.7	10	58.9	−4.8				
Greenville	Bond	68.9	10	63.3	−5.6				
Golconda	Pope	70.7	11	67.3	−3.4				
Peoria	Peoria	66.9	33	61.9	−5.0	73.3	1881	59.9	1866
Riley	McHenry	60.5	27	56.4	−4.1				
Indiana.									
Blue Lick	Clark	68.3	11	64.0	−4.3				
Vevay	Switzerland	68.7	21	64.3	−4.4	76.3	1881	63.8	1875
Iowa.									
Cresco	Howard	59.2	15	55.8	−3.4				
Independence	Buchanan	60.0	13	57.0	−3.0	64.0	1884	57.0	1888
Monticello	Jones	61.5	35	58.4	−3.1	73.0	1865	51.0	1856
Kansas.									
Yates Centre	Woodson	67.7	8	65.3	−2.4	73.9	1884	64.0	1883
Maine.									
Gardiner	Kennebec	58.3	52	55.3	−3.0	64.2	1841	53.3	1845
Maryland.									
Cumberland	Alleghany	63.7	17	59.3	−4.4	70.0	1881	59.3	1888
Massachusetts.									
Somerset	Bristol	64.3	18	62.0	−2.3				
Worcester	Worcester	61.4	50	56.9	−4.5	69.3	1881	56.7	1883
Michigan.									
Adrian	Lenawee	61.5	11	58.7	−2.8				
Kalamazoo	Kalamazoo	62.3	13	59.0	−3.3				
Thornville	Lapeer	62.9	12	58.2	−4.7				
New Jersey.									
Moorestown	Burlington	65.3	25	63.0	−2.3	73.6	1881	60.6	1871
New York.									
Palermo	Oswego	57.7	35	56.0	−1.7	67.8	1881	54.1	1867'83
Ohio.									
Wauseon	Fulton	62.7	18	59.2	−3.5	71.1	1881	57.2	1883
Oregon.									
Albany	Linn	60.4	10	64.7	+4.3	64.7	1888	53.3	1884
Eola	Polk	56.0	18	64.1	+8.1				
Pennsylvania.									
Dyberry	Wayne	58.8	22	54.5	−4.3	66.9	1881	52.5	1871
Wellsborough	Tioga	61.4	10	55.4	−6.0	73.8	1881	52.3	1883
South Carolina.									
Stateburg	Sumter	73.4	8	69.9	−3.5	77.9	1881	69.9	1888
Tennessee.									
Milan	Gibson	69.7	6	67.1	−2.6	87.0	1884	55.0	1883
Texas.									
New Ulm	Austin	77.7	17	76.5	−1.2	81.0	1872	75.6	1876
Vermont.									
Strafford	Orange	59.2	14	57.4	−1.8	64.4	1881	56.2	1876
Virginia.									
Bird's Nest	Northampt'n	70.6	19	68.5	−2.1	79.8	1881	61.2	1877
West Virginia.									
Helvetia	Randolph	61.4	12	58.6	−2.8				

Excessive maximum temperatures were reported in localities throughout the extreme northwestern part of the country and in the Sacramento Valley, the reading at Spokane Falls being 11°, and that at Sacramento 5° higher than for any preceding September during the last eight and eleven years, respectively. Over the eastern part of the United States north of the thirty-fifth parallel the maximum generally ranged from 10° to 23° below those reported during the spell of excessive heat in September, 1881.

The minimum temperatures generally fell below any previously recorded at stations east of the Mississippi River, the lowest readings being registered, as a rule, on the 30th. To the westward of the Mississippi and over the upper lake region the minima were above those reported for previous years by amounts ranging to 18° in northern Nevada.

FROST.

Frosts occurred during September as follows:

1st, Colo., Dak., Ill., Mich., Minn., Wis. 2d, Ill., Ind., Mich., Minn., Mont., N. Y., Ohio. 3d, Ind., N. H., Wis. 4th, Dak., Mich., Minn. 5th, Iowa, Mich., Minn., N. H., N. Y., Oregon. 6th, Conn., Me., Mass., Mich., N. H., N. Y., Pa., Vt. 7th, Conn., Me., Mass., N. H., N. Y., Pa., Vt. 8th and 9th Dak.

10th, Mich., Minn., Wis. 11th, Mont., Wyo. 12th, Dak., Iowa, Mich., Minn., Wis. 13th, Cal., Ill., Ind., Iowa, Mich., Minn., Mo., N. Y., Ohio, Pa., Wis. 14th, Conn., Ill., Ind., Me., Mich., N. Y., Ohio, Pa., S. C., W. Va., Wis., Wyo. 15th, Dak., Iowa, Kans., Mich., Nebr., Pa., Vt. 16th, Dak., Ind., Minn., Mo., Nebr., Oregon. 17th, Dak., Iowa, Kans., Minn., Nebr., N. Y. 18th, Dak., Iowa, Minn., Nebr., Nev., Oregon, Pa. 19th, Cal., Colo., Ill., Iowa, Minn., Nev., Oregon. 20th, Dak., Mich., Mont., Oregon, Wyo. 21st, Ind., Mich., Nebr., Nev., Oregon, Wyo. 22d, Mich., Nev., Oregon. 23d, Oregon, Wash. T., Wis. 24th, Mich., N. Y., Vt. 25th, Conn., Dak., Ky., Mass., Mich., Minn., Nebr., N. H., Vt. 26th, Ala., Cal., Ill., Ind., Mich. 27th, Dak., Ill., Iowa, Kans., Mich., Minn., Mont., Nebr., Ohio, Tenn., W. Va., Wis., Wyo. 28th, Ala., Dak., Ga., Ill., Ind., Iowa, Kans., Ky., Md., Mass., Mich., Minn., Mo., Nebr., N. H., N. Y., Ohio, Pa., Tenn., W. Va., Wis. 29th, Ala., Conn., Dak., Ga., Ill., Ind., Iowa, Kans., Ky., Me., Md., Mass., Mich., Minn., Nebr., N. H., N. J., N. Y., N. C., Ohio, Pa., R. I., Tenn., Vt., Va., W. Va., Wis. 30th, Ala., Conn., Dak., D. C., Fla., Ga., Ill., Ind., Iowa, Kans., Ky., Me., Md., Mass., Mich., Mo., Nebr., N. H., N. J., N. C., Ohio, Pa., R. I., S. C., Tenn., Vt., Va., W. Va., Wis.

The following reports of killing frost have been received:

Whitehall, Muskegon Co., Mich.: the heavy frost which occurred on the morning of the 3d caused severe damage to the corn and buckwheat crops.

Berlin, Green Lake Co., Wis.: frost caused considerable damage to cranberries in dry marshes on the 3d. Reports from several sections in Waushara county state that buckwheat and corn have been much injured.

La Crosse, Wis.: a severe frost occurred at Mather's, Juneau Co., on the 3d; the damage done to the cranberry crop is estimated at about 25 per cent.

Vassar, Tuscola Co., Mich.: buckwheat and vegetables were seriously injured by frost on the 6th.

Elmira, Chemung Co., N. Y.: a heavy frost occurred in this section on the 6th, damaging the tobacco and buckwheat crops.

Danbury, Fairfield Co., Conn.: reports from various parts of the state show that the frost on the 7th caused widespread damage to the corn and tobacco crops.

Portland, Me.: Reports from all parts of the state show that the frost on the 7th was very destructive, it is estimated that the damage done in this state will exceed $1,000,000.

BOSTON, MASS., *Sept.* 7.—One of the most destructive early frosts known for years visited a considerable portion of the counties of Middlesex, Norfolk, and Worcester last night, and hundreds of farmers are mourning the loss of valuable crops, such as cucumbers, tomatoes, squash, and corn. In some places the grape crop is injured seriously. Reports from points in northern New England indicate enormous damage to vines and crops from the frosts, and the loss to farmers will reach many thousands of dollars.—[*The Morning Herald, Baltimore, Md., Sep. 8th.*]

Great Barrington, Berkshire Co., Mass.: reports from the eastern section of this county state that all wheat and tobacco crops were destroyed by the heavy frost of the 6–7th.

Newport, Sullivan Co., N. H., 7th: the heavy frost which occurred during the last two nights throughout this county caused much damage to corn, freezing vines and checking the growth of potatoes.

Bellows Falls, Windham Co., Vt., 7th: reports from the surrounding country show that the frost during the night of the 6–7th was very destructive to corn and garden vegetables.

Saratoga, Saratoga Co., N. Y., 7th: a very heavy frost occurred during the last two nights throughout this county, almost completely ruining the buckwheat crop. Counties north of this city also report heavy frost.

Madison, Wis.: a very heavy frost occurred in this section on the 13th, causing some damage to corn, tobacco, etc.

Chicago, Ill., 14th: reports from several points in Wisconsin state that the frost of yesterday caused much damage to tobacco, cranberries, corn, etc.

Chippewa Falls, Chippewa Co., Wis.: cranberry pickers returning here on the 14th report that the late frost has entirely ruined the cranberry crop.

Tyler's Creek, Cabell Co., W. Va.: heavy frost occurred on the morning of the 29th, damaging crops and vegetables.

Stateburg, Smith Co., S. C.: a heavy white frost occurred on the lowlands on the 30th, severely nipping pea and potato vines.

The occurrence of light frosts in the south Atlantic and east Gulf states during September is unusual though not unparalleled, except in North Carolina, where they frequently occur in this month. In South Carolina light frosts were reported September 24th and 25th, 1885. On September 30th, 1880, light frosts were observed at Gainesville, Ga., and in September, 1879, in parts of South Carolina and Georgia. The records of this office do not show a previous occurrence of frost during this month in northern Florida. It would therefore appear that the month was characterized in these districts by abnormally low minimum temperatures and excessive rainfalls and the year by the premature occurrence of light frosts.

Table of comparative maximum and minimum temperatures for September.

State or Territory.	Stations.	For 1888.		Since establishment of station.				Length of record.
		Max.	Min.	Max.	Year.	Min.	Year.	
		°	°	°		°		Y'rs.
Alabama	Mobile	90.0	52.0	96.2	1887	53.0	1871	18
Do	Montgomery	90.5	46.2	98.8	1887	50.0	1887	16
Arizona	Prescott	90.4	46.0	100.0	1879	39.0	1880	13
Do	Fort Apache	93.1	48.2	96.0	1883	32.0	1880	10
Arkansas	Fort Smith	93.0	48.0	99.9	1884	39.6	1883	7
Do	Little Rock	89.0	55.0	97.0	1887	47.0	1881	10
California	San Diego	82.0	58.4	101.0	1883	49.3	1882	17
Do	San Francisco	87.7	50.1	93.9	1886	49.9	1887	18
Colorado	Denver	90.0	38.0	93.0	1878	28.0	1873	17
Do	Montrose	88.0	40.0	86.0	1885	31.1	1885, 1886	4
Connecticut	New Haven	78.0	31.8	100.0	1881	35.0	1879	16
Do	New London	78.8	34.8	92.0	1881	37.0	1879	17
Dakota	Fort Buford	93.3	24.8	100.0	1882	18.0	1883	10
Do	Yankton	93.0	35.0	100.0	1881	26.0	1876	16
Dis. of Columbia	Washington City	84.5	38.8	104.3	1881	38.0	1879	18
Florida	Jacksonville	92.0	55.0	98.0	1875	35.3	1887	18
Do	Key West	88.7	70.9	96.9	1886	70.5	1886	18
Georgia	Atlanta	86.9	43.0	95.1	1887	44.0	1879	10
Do	Savannah	91.8	47.5	96.0	1876, 1877	50.0	1887	18
Idaho	Boisé City	100.3	40.1	96.0	1878	27.9	1886	12
Illinois	Cairo	87.9	42.5	97.0	1881	42.0	1876	17
Do	Chicago	88.2	36.0	93.9	1881	37.0	1876	17
Indiana	Indianapolis	87.9	33.7	94.5	1881	34.0	1887	16
Indian Ter	Fort Sill	83.0	52.0	100.0	1881	44.0	1878	12
Iowa	Dubuque	83.0	31.0	94.2	1881	33.0	1873	16
Do	Des Moines	90.4	32.0	93.2	1886	34.0	1879	11
Kansas	Dodge City	94.0	41.0	99.3	1881	30.0	1876	14
Do	Leavenworth	92.5	38.9	101.0	1882	37.0	1876	18
Kentucky	Louisville	85.7	36.0	99.0	1881	42.0	1875, 1876	17
Louisiana	New Orleans	91.0	55.0	94.0	1887	58.0	1871	18
Do	Shreveport	92.5	52.0	101.0	1881	47.0	1881	16
Maine	Eastport	70.8	35.6	82.8	1884	35.0	1875	16
Do	Portland	77.7	33.2	94.5	1881	36.5	1887	17
Maryland	Baltimore	84.5	39.0	101.0	1881	40.0	1873, 1879	17
Massachusetts	Boston	78.3	36.2	101.5	1881	34.0	1879	18
Michigan	Marquette	83.4	35.6	97.0	1874	28.0	1883	15
Do	Grand Haven	74.0	36.9	85.0	1881	30.0	1879	16
Minnesota	Saint Vincent	84.0	24.0	89.0	1883	17.0	1883	9
Do	Saint Paul	81.2	30.9	94.0	1878	30.0	1873	16
Mississippi	Vicksburg	90.2	50.2	96.0	1881	48.0	1871	17
Missouri	Saint Louis	89.5	43.0	101.5	1881	40.0	1875	18
Montana	Ft. Assinaboine	92.9	33.0	92.7	1885	25.0	1884	9
Do	Helena	89.0	33.0	88.1	1885	30.0	1880, 1882	9
Nebraska	North Platte	96.0	31.0	101.0	1881	21.0	1876	15
Do	Omaha	95.3	39.1	98.8	1881	30.0	1873	16
Nevada	Winnemucca	93.5	40.0	94.0	1878, 1880	32.0	1880, 1881	10
New Jersey	Atlantic City	80.2	37.0	94.0	1880	40.5	1887	15
New Mexico	Santa Fé	82.5	43.1	90.0	1879	27.0	1880	15
New York	Buffalo	80.0	36.3	98.1	1884	35.0	1878	16
Do	New York City	84.2	40.8	100.2	1881	30.0	1872	17
North Carolina	Charlotte	86.0	38.2	94.0	1881	39.5	1887	10
Do	Wilmington	87.5	43.9	96.0	1872	42.3	1887	18
Ohio	Cincinnati	83.4	35.0	95.0	1881	40.2	1887	18
Do	Sandusky	87.0	31.1	95.8	1881	38.0	1880	12
Oregon	Portland	90.5	43.5	93.0	1886	39.0	1873, 77, 82	16
Do	Roseburg	99.1	40.8	98.5	1886	34.6	1881	12
Pennsylvania	Pittsburg	81.2	39.2	101.6	1881	35.0	1879	16
Do	Philadelphia	81.6	40.5	101.5	1881	42.4	1887	18
Rhode Island	Block Island	74.7	44.3	86.5	1881	41.5	1883	9
South Carolina	Charleston	89.0	50.0	94.0	1876	49.2	1887	16
Tennessee	Knoxville	85.3	35.0	97.1	1881	37.8	1887	18
Do	Memphis	86.2	50.2	96.7	1887	44.0	1875	16
Texas	Brownsville	94.0	65.0	96.0	'77-9, '83-4	57.0	1883	12
Do	Fort Elliott	92.8	44.6	98.0	1881	37.0	1880	9
Utah	Salt Lake City	92.3	48.5	93.0	1875	36.0	1881	15
Virginia	Lynchburg	84.0	35.4	96.3	1881	36.8	1887	16
Do	Norfolk	88.1	40.0	96.0	1881	46.0	1887	18
Washington	Spokane Falls	96.1	35.9	97.0	1882	31.0	1886	8
Do	Olympia	83.0	41.0	82.8	1887	31.0	1877	12
Wisconsin	La Crosse	81.7	29.3	92.0	1873	31.0	1873	16
Do	Milwaukee	81.8	33.8	94.0	1872, 1874	32.0	1876	18
Wyoming	Cheyenne	87.6	30.3	98.0	1875	23.0	1878	16

TEMPERATURE OF WATER.

The following table shows the temperature of the sea-water for September, 1888, as observed at the harbors of the several stations; the monthly range of water temperature; and the mean temperature of the air:

Station.	Temperature at bottom.				Mean temperature of air at the station.
	Max.	Min.	Range.	Monthly mean.	
	°	°	°	°	°
Canby, Fort, Wash	66.0	56.0	10.0	61.7	59.0
Cedar Keys, Fla	88.5	71.9	16.4	80.9	75.4
Charleston, S. C	83.1	73.8	9.3	80.4	74.0
Eastport, Me	51.0	49.7	1.3	50.3	52.8
Galveston, Tex	87.0	75.5	11.5	84.8	77.5
Key West, Fla	87.0	81.0	6.0	85.0	82.4
New York City	69.8	61.6	8.2	67.6	62.9
Pensacola, Fla	84.0	70.6	13.4	80.4	74.6
Portland, Me	59.9	52.0	7.9	56.0	55.2
Portland, Oregon	74.0	64.0	10.0	68.7	65.8

COTTON REGION REPORTS.

In the districts bordering on the lower Mississippi river and the west Gulf coast the rainfall was generally below the September average, the deficiency being greatest in the Galveston district. In the districts of the east Gulf and south Atlantic states the rainfall was in excess by amounts which averaged over ten inches in the Atlanta district. The mean temperature was below the normal in all districts, the departures generally averaging more than 2°. In the districts east of the Mississippi River the minimum temperatures registered on the 30th were the lowest September readings ever reported to this office, the greatest departures below the record of minima being 4°, at Montgomery, Ala.

In the following table the average rainfall and the means of the maximum and minimum temperatures in the cotton regions for September, 1888, are given, together with normals computed from similar observations for the corresponding month of the past six years, and the departures for the current month:

Temperature and rainfall data for the cotton districts, September.

Districts.	Rainfall.			Temperature.							
				Maximum.			Minimum.			Extremes for Sept., 1888.	
	Average for Sept. of six preceding years.	Average for Sept., 1888.	Departures.	Mean for Sept. of six preceding years.	Mean for Sept., 1888.	Departures.	Mean for Sept. of six preceding years.	Mean for Sept., 1888.	Departures.	Max.	Min.
	Inches	*Inches*	*Inches.*	°	°	°	°	°	°	°	°
New Orleans	3.24	1.16	— 2.08	87.5	86.0	— 1.5	66.6	63.9	— 2.7	95	44
Savannah	3.42	7.60	+ 4.18	86.7	84.3	— 2.4	66.9	66.5	— 0.4	97	43
Charleston	3.56	7.67	+ 4.11	84.7	82.2	— 2.5	64.4	66.6	+ 2.2	93	38
Atlanta	2.68	12.75	+10.07	83.8	79.1	— 4.7	62.9	62.3	— 0.6	90	32
Wilmington	3.85	9.19	+ 5.34	82.4	79.6	— 2.8	61.7	63.1	+ 1.4	95	34
Memphis	2.48	2.72	+ 0.24	84.9	79.4	— 5.5	61.3	59.8	— 1.5	90	36
Galveston	4.03	1.54	— 2.49	87.8	86.0	— 1.8	66.7	65.7	— 1.0	99	43
Vicksburg	3.55	1.90	— 1.65	87.6	84.2	— 3.4	65.6	63.4	— 2.2	94	44
Montgomery	1.93	4.75	+ 2.82	86.2	81.3	— 4.9	64.0	63.6	— 0.4	91	42
Augusta	2.58	10.05	+ 9.47	84.9	80.0	— 4.9	64.7	63.1	— 1.6	91	35
Little Rock	2.39	0.83	— 1.56	86.4	83.2	— 3.2	60.4	62.0	+ 1.6	97	42
Mobile	2.07	3.74	+ 1.67	88.4	83.5	— 4.9	64.3	63.4	— 0.9	94	44

PRECIPITATION (expressed in inches and hundredths).

The distribution of rainfall over the United States and Canada as determined from reports of about one thousand stations, is exhibited on chart iv by ruled shading In the table of miscellaneous meteorological data the total precipitation and the departures from the normal are given for each Signal Service station. The figures opposite the names of geographical districts in the columns for precipitation show the averages for the several districts. Chart v exhibits the normal distribution of September precipitation as determined from the observations of eighteen years, 1871 to 1888.

The heaviest rainfall for September, 1888, occurred in the south Atlantic and east Gulf states. In the upper valley of the Chattahoochee River the excess over the normal amounted to more than eleven inches, while at Lynchburg, Va., there was an excess of more than seven inches. In New England the precipitation was excessive, notably at Wood's Holl, Mass., where the total fall was greater than the average by more than eight inches. In the Lake region west of Lake Ontario, in the Ohio Valley, and all districts lying in and west of the Mississippi Valley, the depth of rainfall reported generally fell below the average for the month, the greatest deficiency occurring in southwestern Missouri where it was more than seven inches. Throughout a great part of the central valleys the deficiencies averaged less than three inches; they were most marked in the central and southern districts where in localities they amounted to more than three, and at one station (Galveston, Tex.) to over four inches. At isolated stations, notably at Charleston, S. C., Hatteras, N. C., and Rochester, N. Y., there were small deficiencies. In the Rocky Mountain regions the total rainfalls were unusually small, the deficiencies being most marked in the northern and southern plateau. On the Pacific coast the precipitation was normal along the southern coast of California; at San Francisco the excess was more than .80 inch, while along the coast of Washington Territory the deficiencies varied from 1.79 inches at Fort Canby and 2.58 inches at Astoria to 3.44 inches at Neah Bay.

DEVIATIONS FROM AVERAGE PRECIPITATION.

The following table shows for certain stations, as reported by voluntary observers, (1) the average precipitation for a series of years; (2) the length of record during which the observations have been taken, and from which the average has been computed; (3) the total precipitation for September, 1888; (4) the departures of the current month from the average; (5) and the extreme monthly precipitation for September during the periods of observation and the year of occurrence:

State and station.	County.	(1) Average for the month of Sept.	(2) Length of record.	(3) Total for Sept., 1888.	(4) Departure from average.	(5) Extreme monthly precipitation for Sept.			
						Greatest.		Least.	
						Am't.	Year.	Am't.	Year.
Arkansas.		*Inches*	*Years*	*Inches*	*Inches.*	*Inches*		*Inches.*	
Lead Hill	Boone	4.60	8	0.48	—4.12	8.44	1886	0.48	1888
California.									
Sacramento	Sacramento	0.15	22	0.51	+0.36	0.90	1883	0.00	*
Connecticut.									
Southington	Hartford	2.64	19	7.80	+5.16	10.13	1882	0.38	1881
Florida.									
Merritt's Island	Brevard	8.18	11	8.01	—0.17	23.78	1878	3.01	1882
Illinois.									
Aurora	Kane	2.84	10	1.89	—0.95	.....	.....	.....	.....
Golconda	Pope	4.12	11	0.72	—3.40	.....	.....	.....	.....
Peoria	Peoria	3.54	33	4.79	+1.25	9.61	1875	0.60	1867
Riley	McHenry	3.57	27	1.00	—2.57	.....	.....	.....	.....
Indiana.									
Vevay	Switzerland	3.43	21	4.22	+0.79	6.72	1868	0.47	1871
Iowa.									
Cresco	Howard	4.39	16	0.82	—3.57	.....	.....	.....	.....
Independence	Buchanan	5.36	13	1.13	—4.23	12.87	1887	1.13	1888
Monticello	Jones	4.07	35	1.85	—2.22	10.15	1881	0.00	1871
Kansas.									
Yates Centre	Woodson	3.91	8	3.91	0.00	8.31	1881	0.44	1883
Maine.									
Gardiner	Kennebec	3.30	50	7.12	+3.82	8.24	1868	1.00	1846
Maryland.									
Cumberland	Alleghany	2.69	17	2.95	+0.26	8.50	1882	0.40	1873
Fallston	Harford	4.21	18	7.69	+3.48	12.95	1876	0.23	1884
Massachusetts.									
Somerset	Bristol	2.67	18	7.27	+4.60	.....	.....	.....	.....
Worcester	Worcester	3.32	50	7.56	+4.24	10.01	1882	0.20	1855
Michigan.									
Thornville	Lapeer	2.91	12	1.52	—1.39	.....	.....	.....	.....
Kalamazoo	Kalamazoo	3.37	13	2.40	—0.97	.....	.....	.....	.....
Adrian	Lenawee	4.06	11	1.19	—2.87	.....	.....	.....	.....
New Jersey.									
Moorestown	Burlington	3.73	25	5.30	+1.57	11.71	1882	0.16	1884
New York.									
Palermo	Oswego	3.06	35	4.23	+1.17	7.30	1866	1.04	1880
Humphrey	Cattaraugus	3.77	6	3.55	—0.22	4.82	1884	2.85	1883

Deviations from average precipitation—Continued.

State and station.	County.	(1) Average for the month of Sept.	(2) Length of record.	(3) Total for Sept., 1888.	(4) Departure from average.	(5) Extreme monthly precipitation for Sept.			
						Greatest.		Least.	
						Am't.	Year.	Am't.	Year.
Ohio.		*Inches*	*Years*	*Inches*	*Inches.*	*Inches*		*Inches.*	
Wauseon	Fulton	2.47	16	0.84	—1.63	5.29	1879	0.55	1871
Oregon.									
Albany	Linn	2.16	10	0.64	—1.52	5.61	1884	0.41	1882
Eola	Polk	1.60	18	0.54	—1.06	6.59*	1884	0.00	1873
Pennsylvania.									
Dyberry	Wayne	2.73	19	6.49	+3.76	6.49	1888	1.60	1881
Wellsborough	Tioga	4.18	10	1.75	—2.43	5.86	1882	1.05	1879
South Carolina.									
Statesburg	Sumter	3.66	8	5.31	+1.65	6.67	1884	0.75	1887
Kirkwood	Kershaw	3.75	22	6.52	+2.77	8.51	1873	0.80	1860
Tennessee.									
Milan	Gibson	2.89	6	0.64	—2.25	4.96	1884	0.64	1888
Texas.									
New Ulm	Austin	5.46	17	2.01	—3.45	15.08	1874	0.90	1872
Vermont.									
Strafford	Orange	3.57	14	6.10	+2.53	6.30	1882	0.70	1884
Virginia.									
Bird's Nest	Northampton	3.24	19	5.50	+2.26	7.70	1876	0.00	1884
West Virginia.									
Helvetia	Randolph	3.66	12	2.77	—0.89	.....	.....	.....	.....

*Frequently.

HAIL.

Under the heading "Local storms" will be found descriptions of the more severe hail storms which occurred during the month. In addition to these hail was reported in the various states and territories as follows:

2d, Vt. 3d, Cal. 4th, Ill. 5th, Ariz., N. Y., Wyo. 7th, Kans., Minn. 8th, Mich. 10th, Iowa. 11th, Mo. 12th, Kans., N. J., Pa., Tex. 13th, Pa. 16th, Ill, Ind. 17th, Nev. 18th, Ariz. 20th, Kans., N. Y., Vt. 21st, Ill., Ind., Iowa., Kans., Mo. 22d, Tenn. 26th, Md., Mich. 27th, Mich., N. Y., Ohio. 28th, Ind., Md., Mich., Minn., N. Y., Ohio, Oregon, Pa., Wis. 29th, Mich., N. H., N. J., N. Y., Ohio, Pa. 30th, Md., Mich., N. J., N. Y., Ohio, Pa.

SLEET.

Sleet fell as follows: 13th, Mount Washington, N. H. 27th, Kalamazoo, Mich. 28th, Detroit and Kalamazoo, Mich.; Wauseon, Ohio. 29th, Alpena, Marquette, and Sault de Sainte Marie, Mich.; Erie, Pa.; East Berkshire, Lunenberg, and Northfield, Vt.; Helvetia and Rockport, W. Va. 30th, Corry and Wellsborough, Pa.; Northfield, Vt.

MONTHLY SNOWFALLS (in inches and tenths).

Snow fell in the various states and territories as follows:

Colorado.—Pike's Peak, 5th, 6th, 17th to 19th, 26th, 29th, 30th; total, 1. *Maryland**.—30th. *Michigan**.—27th to 30th. *New Hampshire.*—Mount Washington, 1st, 3d, 14th, 21st to 23d, 26th, 29th, 30th; total, 17.3. *New Jersey** and *New York**.—29th, 30th. *Ohio** and *Pennsylvania**.—28th to 30th. *Vermont.*—Trace, except at Lunenburg, 0.5, 29th, 30th. *Virginia**.—29th. *West Virginia.*—Middlebrook, 2, and Helvetia 0.5 on the 29th.

The only stations reporting unmelted snow on ground at the end of the month were Mount Washington, N. H., 4.7, and Lunenburg, Vt., 0.5 inches.

*Total for the month, trace.

EXCESSIVE PRECIPITATION FOR SEPTEMBER.

For this month rainfalls of ten or more inches have been most frequently reported in or contiguous to the districts of the Atlantic and Gulf coasts and in the upper Mississippi valley. Over a greater part of the Ohio Valley and Tennessee, and in the Lake region, but few instances have been reported wherein the September rainfall has exceeded ten inches, while in the districts west of the ninety-eighth meridian this amount has not been recorded, except in Texas and the northwest portion of Washington Territory. For the east Gulf states a maximum fall of 25.11 inches was reported at Biscayne, Fla., in 1878; in the south Atlantic States, 27.40, Saint Mary's, Ga., 1881; in the middle Atlantic states, 25.98, Paterson, N. J., 1882; in the west Gulf states, 30.57, Brownsville, Tex., 1879; in the upper Mississippi valley, 18.51, White Earth Reservation, Minn., 1869. The largest excesses in rainfall have been most frequent in the districts in which these stations are located, their occurrence being noted at average intervals of three or four years; at a majority of the places of observation they have occurred less frequently, and at a number of the older established stations rainfalls exceeding ten inches have not been recorded. On the Pacific coast the largest September rainfalls were, 12.15 inches at Neah Bay, Wash., 1885; and 2.91, Red Bluff, Cal., 1885. In the plateau regions, 5.41, at Fort Apache, Ariz., 1881, and 3.15 at Salt Lake City, Utah, 1878. Along the eastern slope of the Rocky Mountains, 2.02 at Cheyenne, Wyo., 1877. As compared with the preceding summer months, the excessive monthly rainfalls of September have been more generally confined to the Atlantic and Gulf States. In the central valleys their occurrence has not, as a rule, been so generally noted in the latter month.

Daily rainfalls of 2.50 inches or more have occurred in September in all districts east of the one hundredth meridian, except in the vicinity of Lake Ontario. Their occurrence has been most frequently reported in the regions in which the monthly rainfalls were most frequent, and the number of instances recorded exceeded in number the monthly excesses. As compared with the preceding summer months, excessive daily rainfalls have occurred at closer intervals at several stations, notably at Galveston and Brownsville, Tex., and at Hatteras, N. C.; at other stations their occurrence has been less frequently noted. The following are some of the heavier daily rainfalls reported: 10.42 inches at Carlowville, Ala., 1877; 13.72, Mayport, Fla., 1885; 10.70, Fort Delaware, Del., 1868; 17.90, Paterson, N. J., 1882; 12.45, Baton Rouge, La., 1877; 11.91, Brownsville, Tex., 1886; 11.87, Mount Angel, Oregon, 1886, and 2.91 at Red Bluff, Cal., in 1885.

While the instances in which one inch or more of rain has fallen in one hour have been less frequently reported than the cases of excessive monthly and daily precipitation, there is little doubt that the downpours of short duration occasion the greatest damage to property and crops. In many instances they occur as veritable cloud-bursts, and the artificial and natural drains in city and country prove inadequate to promptly carry off the enormous quantity of water precipitated during their continuance. September storms of this description have occurred most frequently along the Atlantic coast south of the forty-third parallel; on the Gulf coasts of Florida and Texas, and in the Mississippi and Missouri valleys south of the forty-third parallel, where at a number of stations they have been recorded at intervals of three to four years. In the valleys of the smaller rivers east of the one hundredth meridian, and at three lake stations (Toledo, Grand Haven, and Marquette), excessive hourly rainfalls have been generally noted in but one or two instances, except in the upper valley of the Chattahooche River and the central valley of the Red River, where they have occurred at closer intervals. No hourly rainfalls exceeding one inch have been reported west of the one hundredth meridian, except in western Nebraska and southeastern Arizona.

The following table shows some of the heaviest rainfalls of short duration reported, and the rate of fall per hour:

Station.	Year.	Date.	Actual fall.	Duration.	Rate per hour.
			Inches.	*h. m.*	*Inches.*
Alpena, Mich	1884	10	1.05	0 11	5.73
Omaha, Nebr	1881	28	1.00	0 15	4.00
Charleston, S. C	1877	13	2.00	0 30	4.00
Cairo, Ill	1871	13	1.45	0 27	3.22
Cedar Keys, Fla	1888	2	1.70	0 30	3.40
Rio Grande City, Tex	1879	26	1.93	0 35	3.31
Fort Riley, Kans	1870	15	1.07	0 20	3.21
Saint Louis, Mo	1849	19	3.00	1 00	3.00
Nelson, Tex	1867	30	4.00	1 30	2.67
New York City	1882	22	1.00	0 25	2.40
Shreveport, La	1872	24	2.05	0 58	2.12
Fort Apache, Ariz	1886	8	1.66	0 55	1.81

Table showing for the month of September monthly rainfalls of 10 inches, or more (in states where monthly rainfalls did not reach 10 inches the station reporting the maximum amount is given); rainfalls of 2.50 inches, or more, in any 24 consecutive hours; and rainfalls equaling or exceeding one inch in one hour.

States and stations.	Rainfall of 10 inches, or more, per month.		Rainfall of 2.50 inches, or more, in 24 hours.			Rainfall equaling or exceeding one inch per hour.			
	Year.	Amt.	Year.	Day.	Amt.	Year.	Day.	Time.	Amt.
Alabama.		*Inches.*			*Inches*			*h. m.*	*Inches*
Carlowville	1877	12.43	1877	18–20	10.42				
Citronelle			1888	23	3.05				
Green Springs	1877	14.11	1877	18–20	8.20				
Livingston			1888	7	4.25	1888	7	4 00	4.25
Marion			1887	17	3.25				
Do			1888	15	3.17				
Mobile	1877	12.68	1873	17	5.28				
Do	1881	11.71	1875	24	3.02				
Do			1875	25	3.11				
Do			1877	18	7.00				
Do			1881	14	2.97				
Do			1881	25	2.74				
Do			1881	26	3.27				
Do			1885	4	3.23				
Do			1887	27	4.57				
Montgomery			1872	11	3.09	1888	2	1 30	1.63
Do			1875	27	3.34				
Do			1882	10	2.67				
Mount Vernon			1887	26–27	4.38				
New Market			1888	14	4.80	1888	14	2 00	4.80
Opelika			1885	20	3.55				
Do			1886	2	2.90				
Roanoke	1885	10.00							
Troy	1882	10.25	1882	7–9	9.34				
Tuscumbia			1886	14	4.71				
Arizona.									
Fort Apache	1881	5.41	1881	11–12	2.97	1886	8	0 55	1.66
Fort Grant			1887	8–9	3.21	1887	8	0 58	1.28
Fort Huachuca			1887	9	2.52				
Fort McDowell			1887	30	4.11				
Prescott			1887	11	3.14				
Arkansas.									
Arkansas City			1885	19	2.90				
Fort Smith			1881	26	2.72				
Helena			1874	5	3.05				
Do			1875	18	2.62				
Do			1886	14	3.85				
Lead Hill			1886	25	2.60	1884	10	0 50	1.15
Little Rock	1886	6.24	1883	30	2.77				
Do			1886	13–14	2.51				
Magnolia			1886	13	2.50				
Malvern			1886	12	3.00				
Do			1886	13	2.50				
Mount Ida			1877	8–9	4.00				
Newport			1884	27	2.62				
Pine Bluff			1886	14	5.02				
Prescott			1884	29	3.18				
Russellville			1886	25	3.00				
Texarkana			1884	29	4.65				
California.									
Red Bluff	1885	2.91							
Do			1885	24	2.91				
Colorado.									
Colorado Springs			1874	22–23	2.74				
Pike's Peak	1880	3.87							
Connecticut.									
Canton	1868	11.25							
Hartford			1888	16	2.65				
New Hartford			1888	8	2.50				
New Haven	1882	13.43	1876	17	2.70				
Do			1878	4–5	6.69				
Do			1880	29–30	2.80				
Do			1882	11–12	4.27				
New London			1882	11–12	4.42				
Southington	1882	10.13	1888	9	2.50				
Do	1882	10.13							
Fort Trumbull			1869	26–27	2.96				
Dakota.									
Fort Abercrombie			1869	1	3.46				
Do			1877	7–8	3.10				
Fort Randall			1876	8–9	3.40				
Smithville			1881	6	4.08				
Webster			1885	12	3.81				
Yankton	1881	8.61	1875	2	3.00	1875	2	1 30	1.50
Do			1879	29	2.59				
Do			1885	11–12	2.53				
Do			1881	6	3.45				
Delaware.									
Fort Delaware	1868	19.85	1868	3–4	10.70				
Do			1868	9	2.60				
Dover	1876	12.46	1876	16–17	3.00				
Milford	1874	11.05							
District of Columbia.									
Distributing reservoir			1888	17	3.07				
Washington City	1876	10.81	1874	15–16	5.66				
Do			1876	17	3.37				
Florida.									
Alva	1888	11.82	1888	8	6.70				
Archer	1885	11.62	1885	3	3.31	1885	3	2 00	3.31
Do	1888	10.82	1885	26	3.50				
Do			1888	8	3.64				
Fort Barrancas	1873	11.15	1873	18	5.80	1878	23	0 35	1.64
Do	1880	12.80	1880	4	3.15	1878	27	0 45	1.22
Do	1882	11.82	1881	14	4.72				
Do	1884	10.75	1882	8–9	7.35				

Table showing for the month of September, &c.—Continued.

States and stations.	Rainfall of 10 inches, or more, per month.		Rainfall of 2.50 inches, or more, in 24 hours.			Rainfall equaling or exceeding one inch per hour.			
	Year.	Amt.	Year.	Day.	Amt.	Year.	Day.	Time.	Amt.
Florida—Continued.		*Inches.*			*Inches*			*h. m.*	*Inches*
Fort Barrancas			1884	2	5.33				
Do			1884	6	3.12				
Biscayne	1874	16.90							
Do	1876	14.90							
Do	1878	25.10							
Cedar Keys	1888	12.89	1881	15–16	4.81	1880	10	1 00	1.00
Do			1882	9–10	4.09	1881	16	4 00	4.46
Do			1885	26	2.83	1888	2	0 30	1.70
Do			1888	2	2.92				
Daytona	1878	19.45	1879	26	2.98	1876	27	2 30	3.40
Do	1879	12.77	1876	27	3.40				
Do			1880	9	2.98				
Duke	1888	11.86							
Fernandina	1885	13.16							
Homeland			1888	8–9	2.75				
Jacksonville	1872	10.79	1874	27–28	2.64	1873	5	0 33	1.50
Do	1873	10.47	1878	8–9	3.40	1883	17	1 00	1.50
Do	1878	21.13	1878	10–11	4.29				
Do	1885	19.63	1878	28–29	2.72				
Do	1888	11.15	1885	19–20	4.03				
Do			1885	26–28	10.29				
Do			1887	17–18	3.88				
Do			1887	19–20	3.39				
Jupiter			1888	12–13	3.40				
Key West	1875	10.67	1875	20–21	3.14	1879	18	1 40	2.50
Do	1881	10.71	1879	17–18	2.68				
Do			1887	16–17	3.03				
Limona	1885	10.64				1883	20	2 00	2.18
Live Oak	1885	11.18	1885	20	3.60				
Manatee	1885	13.68							
Do	1888	10.03	1888	8–9	5.00				
Matanzas	1888	11.86							
Mayport	1878	13.28	1885	21	9.52				
Do	1879	11.51							
Do	1885	23.24	1885	26–29	13.72				
Fort Mead			1887	19	2.90				
Merritt's Island	1876	23.78	1878	5	5.20	1885	20	1 00	1.20
Do	1879	10.26	1878	9	9.09	1886	3	0 45	1.18
Do	1885	11.15	1878	10	7.04	1888	1	0 45	1.00
Do	1887	11.96	1885	26	4.40				
Do			1887	3	4.95				
Micco			1888	8	2.50				
Okahumpka	1879	10.50							
Pensacola	1880	11.54	1880	8	3.70				
Do			1880	26	2.73				
Do			1881	15	5.60				
Do			1882	9	4.87				
Punta Rassa	1879	13.78							
Saint Augustine	1878	11.96	1882	8–9	3.66				
Do	1885	12.24	1887	19	4.00				
Saint Francis (Barracks)			1878	10	5.60				
Saint Marks			1879	1	4.08				
Sanford	1885	10.73	1885	11	2.76				
Tallahassee			1886	10	3.40				
Do			1887	28	3.20				
Georgia.									
Albany			1887	28	2.50				
Do			1888	9	5.20				
Allapaha	1888	11.08	1882	9–10	6.98				
Andersonville			1888	8	2.52				
Athens	1888	11.35	1882	10	4.40				
Do			1885	20	2.60				
Do			1885	21	2.70				
Do			1888	5	2.72				
Atlanta	1888	14.26	1880	25	3.17	1888	3	0 45	1.55
Do			1888	15–16	5.88	1888	4	1 00	1.36
Do						1888	15	0 45	1.83
Do						1888	15	0 45	1.21
Augusta			1874	27–28	3.16				
Do			1878	11–12	4.37				
Do			1881	17	2.88				
Do			1888	9–10	3.61				
Augusta Arsenal						1871		1 00	1.45
Blackshear	1878	11.90							
Bainbridge			1887	28	3.00				
Brunswick	1878	12.04							
Do	1885	22.08							
Calhoun			1882	10	2.87				
Camak	1888	16.92	1885	21	2.67				
Do			1888	9	4.50				
Do			1888	10	3.83				
Cartersville			1888	6	2.50				
Columbus	1888	12.00	1887	17	2.52				
Covington			1882	10	3.30				
Dalton			1883	22	2.50				
Eastman			1882	9–10	4.57				
Do			1888	14	4.00				
Ellerslie	1885	14.00							
Forsyth			1888	4	2.50	1884	21	1 00	1.10
Fort Gaines			1882	10	3.73				
Do			1887	28	2.60				
Gainesville	1888	12.61	1887	26	2.60				
Do			1888	5	4.29	1877	12	0 45	1.62
Griffin	1885	11.64	1882	10	3.59				
Do	1888	10.14	1885	20–21	5.80				
Do			1888	1	3.49				
Jesup	1885	12.52	1885	27	7.82				
Macon	1888	10.65	1882	10	6.50				
Do			1888	9	3.60				
Do			1888	23	3.00				
Madison			1882	10	5.34				

Table showing for the month of September, &c.—Continued.

States and stations.	Rainfall of 10 inches, or more, per month.		Rainfall of 2.50 inches, or more, in 24 hours.			Rainfall equaling or exceeding one inch per hour.			
	Year.	Amt.	Year.	Day.	Amt.	Year.	Day.	Time.	Amt.
Georgia—Continued.		*Inches.*			*Inches*			h. m.	*Inches*
Massey Creek			1887	28	3.00				
McPherson Barracks			1870	29	6.30				
Do.			1880	24	3.00				
Milledgeville	1888	11.00	1885	20-21	4.40				
Do.			1888	9	5.50				
Millen	1888	10.98	1882	7	4.32				
Do.			1883	6	2.70				
Do.			1888	9	3.00				
Newnan			1882	10	3.04				
Quitman			1880	1	3.00	1880	1	2 00	3.00
Raban Gap	1881	13.65	1887	17	6.20				
Saint Mary's	1878	10.19				1876	3	1 00	1.60
Do.	1885	27.41							
Savannah	1885	12.00	1874	27-28	3.81	1874	17	1 00	2.16
Do.	1888	10.34	1878	11	3.63	1877	14	1 00	1.11
Do.			1878	14	3.75	1888	18	1 15	1.98
Do.			1882	6-7	4.90				
Do.			1884	10	3.16				
Do.			1885	20-21	3.17				
Smithville			1882	8-10	8.04				
Thomasville			1876	6	3.04	1878	2	1 00	1.00
Do.			1886	10	3.50				
Do.			1887	28	3.34				
Toccoa	1888	15.77	1888	16	3.16				
Tybee Island	1877	11.24	1877	20	2.61				
Union Point	1888	14.66	1882	10	3.49				
Do.			1888	9	4.40				
Washington	1888	12.63	1888	9	4.00				
Do.	1878	13.12	1888	10	3.00				
Walthourville	1885	12.70							
Do.			1885	29	3.80				
Way Cross	1885	16.13	1886	11	3.10				
West Point			1882	10	3.43				
Do.			1885	20	4.70				
Waynesborough			1884	11	3.05				
Idaho.									
Boisé City	1884	2.11							
Illinois.									
Abingdon			1875	9	4.00				
Do.			1876	5	4.30				
Anna			1877	1	2.02				
Augusta	1876	10.67	1878	9	4.82				
Do.			1876	5	3.48				
Do.			1876	7-8	5.27				
Beardstown			1885	13	3.00				
Cairo			1884	29	2.90	1871	13	0 27	1.45
Do.						1872	28	0 55	1.25
Do.						1873	3	0 55	1.45
Do.						1877	9	0 45	1.10
Chicago			1875	8-9	3.44	1886	9	1 00	1.20
Decatur			1886	16	2.80				
Geneseo			1874	18	3.50				
Do.			1875	8	3.00				
Havana			1875	9	3.05				
Louisville			1880	19	3.20				
Lyndon			1874	18-19	3.50	1866	4	2 15	2.76
Do.			1875	8-9	2.50				
Marengo			1866	4	2.76	1860	5	2 00	2.10
Martinsville			1886	27-28	5.25				
Mount Carmel			1885	29	4.03				
Mount Sterling						1886	1	0 30	1.40
Pana			1886	16	4.50				
Peoria			1888	21	3.10				
Rockford			1874	19	2.55				
Rock Island			1874	18	4.00				
Sandwich			1875	8-9	2.85				
Do.			1886	19	2.84				
Springfield			1881	30	2.74	1886	16	1 33	1.42
Do.			1884	26-27	2.88				
Do.			1886	16	3.25				
Wyanet			1875	8-9	3.00				
Do.			1875	15	3.00				
Indiana.									
Fort Wayne			1877	9-10	3.90				
Do.			1879	2-3	4.10				
Do.			1885	12	2.50				
Indianapolis			1879	2-3	3.47				
Logansport			1885	13	3.18				
Marengo	1884	10.80							
Do.	1885	10.20							
New Corydon			1885	14	3.36				
Saint Meinrad's Abbey			1879	2-3	4.25				
Do.			1881	14-15	3.80				
Vevay						1883	23	1 30	2.25
Indian Territory.									
Fort Gibson	1873	7.28	1887	22	2.76				
Do.			1881	30	2.50				
Fort Sill			1870	7	3.74	1886	26	0 50	1.11
Iowa.									
Afton			1875	1	2.50				
Do.			1875	2	2.60				
Do.			1876	5	2.80				
Albion			1880	25	3.00				
Do.			1879	11	2.50				
Amana			1879	11	2.75	1881	26	2 00	2.32
Do.			1880	25-26	4.52				
Ames			1881	29	2.72	1875	8	1 00	2.30
Boonesborough			1876	4-5	2.50				
Brookville	1876	10.56							
Byron Township	1875	11.00	1874	13-14	2.80				
Do.			1875	2	3.50				

Table showing for the month of September, &c.—Continued.

States and stations.	Rainfall of 10 inches, or more, per month.		Rainfall of 2.50 inches, or more, in 24 hours.			Rainfall equaling or exceeding one inch per hour.			
	Year.	Amt.	Year.	Day.	Amt.	Year.	Day.	Time.	Amt.
Iowa—Continued.		*Inches.*			*Inches*			h. m.	*Inches*
Byron township			1875	6-7	3.00				
Do.			1875	8-9	2.50				
Do.			1878	19-20	2.50				
Corydon			1886	20-21	3.30				
Cresco	1881	10.03							
Davenport			1874	18-19	4.49	1881	3	1 15	1.37
Do.			1887	2-3	2.80	1887	3	1 45	2.01
Denison			1875	2	4.87				
Do.			1874	18	2.50				
Des Moines			1880	25-26	3.41				
Do.			1881	1	2.55				
Do.			1885	7-8	2.68				
Dubuque	1881	10.26	1874	18-19	3.70	1875	9	1 00	1.35
Do.			1875	8-9	4.95	1881	26	1 00	1.00
Do.			1876	5	3.40				
Do.			1878	19-20	2.66				
Do.			1880	25-26	3.79				
Do.			1881	20-27	4.42				
Do.			1881	29-30	2.75				
Fort Madison			1874	18	3.90				
Granville	1881	12.31							
Guttenburg			1876	5	3.49				
Do.			1879	11	2.73				
Do.			1881	26-27	3.11				
Hamlin			1886	26-27	2.50				
Independence	1881	10.20	1884	22-23	7.50				
Do.	1884	10.90							
Do.	1887	12.87							
Keokuk	1876	11.08	1874	18	2.86				
Do.			1874	25	3.22				
Do.			1875	9	3.42				
Do.			1876	5	2.82				
Do.			1876	7	4.89				
Saint Claire			1874	19	2.77				
Logan			1884	23	2.70				
Monticello	1881	10.15	1880	25	5.00				
Do.	1888	10.15	1884	22-23	3.65				
Mount Vernon			1874	18	4.00				
Nashua	1881	14.40	1880	25	8.22				
Do.	1887	10.15							
Newton			1880	25-26	3.18				
Nora Springs	1881	13.03	1881	29	4.00				
Osage	1881	11.01	1881	9	4.00				
Sac City	1887	10.20	1887	4-5	5.70				
Smithland			1887	21	2.75	1884	26	1 00	1.50
Tabor			1876	6-7	2.50				
Vail			1876	4-5	2.75				
Webster City	1887	11.32	1887	4	2.75				
Wesley	1881	13.00	1884	23	2.80				
Kansas.									
Arkansas City			1875	11-12	4.00				
Atchison			1885	7	2.60				
Bunker Hill			1887	9	3.10				
Caldwell	1881	12.15							
Clay Centre			1881	28	3.50	1881	28	3 00	3.50
Do.			1884	13	3.52				
Concordia			1885	7	2.81				
Council Grove			1874	13-14	4.80				
Dodge City			1881	6-7	2.48				
Elk Falls	1885	10.75	1885	5	3.00				
Do.			1885	11	4.00				
Ellsworth			1887	9	2.50				
Fort Riley			1872	10	2.95	1870	15	0 20	1.07
Do.						1867	13	2 00	2.00
Fort Scott	1884	11.45	1881	28	2.79				
Do.			1881	30	5.18				
Do.			1884	26	2.80				
Fort Hays			1871	12	7.00	1878	19	2 00	3.18
Do.			1878	19	3.18				
Independence			1881	30	4.00				
Do.			1884	30	3.30				
Do.			1885	11-12	3.14				
Do.			1886	3-4	4.82				
Fort Larned			1861	24-25	3.40				
Leavenworth			1862	10	2.35	1880	25	1 00	1.24
Do.			1872	22-23	2.57	1864	27	1 00	1.03
Do.			1876	12	2.54				
Do.			1881	1	2.60				
Do.			1884	27	2.50				
Do.			1885	4-5	3.19				
Do.			1885	6-7	2.60				
Manhattan			1887	1	2.97				
Morse			1887	29	3.00				
Oberlin			1887	25	3.20				
Topeka			1884	27	3.98				
Wakeeney			1887	9	2.50				
Wellington	1881	11.19							
West Leavenworth			1885	4	3.20				
Do.			1885	7	2.65				
Yates Centre			1885	4	3.28				
Do.			1888	22	3.49				
Kentucky.									
Greensburg			1887	17	2.61				
Louisville	1884	5.90	1879	2-3	3.70	1876	7	1 25	1.67
Millersburg			1888	16	4.60				
Paducah			1883	*16	3.60				
Do.			1884	30	2.50				
Do.			1885	20	3.02				
Louisiana.									
Alexandria			1884	25	2.57				
Do.			1886	14	2.87				

Table showing for the month of September, &c.—Continued.

States and stations.	Rainfall of 10 inches, or more, per month.		Rainfall of 2.50 inches, or more, in 24 hours.			Rainfall equaling or exceeding one inch per hour.			
	Year.	Amt.	Year.	Day.	Amt.	Year.	Day.	Time.	Amt.
Louisiana—Continued.		*Inches.*			*Inches*			*h. m.*	*Inches*
Baton Rouge	1877	18.42	1877	10	4.85				
Do.			1877	17–19	12.45				
Coushatta			1886	13	3.05				
Grand Coteau	1885	10.58	1887	26–27	3.00				
Do.			1885	3	2.50				
Do.			1885	15	2.75				
Do.			1886	27	2.50				
Lafayette			1887	27	3.20				
Liberty Hill			1885	9	2.50				
New Orleans	1877	13.21	1875	25	5.28				
Do.	1885	13.55	1877	17–18	7.22				
Do.			1885	20	2.78				
Do.			1885	25–26	3.23				
Do.			1887	26	2.88				
Port Eads			1881	26	4.19				
Do.			1882	8–9	5.90				
Shreveport	1880	11.61	1875	17	7.00	1872	24	0 58	2.05
Do.			1877	3	6.87	1874	7	1 00	1.15
Do.			1880	12	2.84				
Do.			1881	14	4.06				
Do.			1885	5	2.86				
Do.			1886	13	2.73				
Maine.									
Dexter			1882	24	2.60				
Fort Preble			1882	5	2.90				
Portland	1882	7.58	1882	24	2.66				
Maryland.									
Baltimore	1876	10.52	1874	16	3.15				
Do.			1876	17	3.94				
Emory Grove			1878	4	3.00				
Do.			1888	17	3.00				
Fallston	1876	12.95	1876	17	3.14				
Do.			1876	23–24	2.50				
Fort Foote			1874	15–16	4.12				
Do.			1876	16–17	2.65				
Jewell			1888	16	3.75	1888	16	3 15	3.75
Fort McHenry			1876	16–17	2.65				
Do.			1877	8	3.20				
Mount Saint Mary's College	1876	11.00	1876	16–17	3.10				
New Market	1876	10.64							
Saint Inigoes			1874	15–16	6.00				
Woodstock College			1876	16–17	3.20				
Do.			1882	10	2.70				
Massachusetts.									
Amherst a	1882	11.85	1888	20–21	3.75				
Do.			1888	8	2.77				
Do.	1888	11.82	1888						
Amherst b	1888	10.70	1888	8	2.72				
Do.			1888	30–31	3.17				
Blue Hill Observatory			1888	26	3.84				
Boston	1882	10.93	1882	22–23	3.55				
Combridge			1888	26	2.82				
Cotuit			1888	26	4.73				
Charleston			1882	11–12	3.09				
Chicopee	1888	10.94							
Deerfield			1888	18	2.90				
Fall River			1888	26	2.70				
Fitchburg c	1868	14.04							
Fitchburg d	1888	10.86							
Fort Warren			1882	23	3.24				
Groton	1888	10.42							
Leominster	1888	10.57							
Long Plain	1888	10.35							
Mendon	1882	10.70							
Milton	1882	10.05	1888	26	3.70				
Mount Nonoluck	1888	10.18							
Nantucket						1888	18	0 55	1.30
New Bedford	1888	11.56	1881	2–3	3.10				
Do.			1888	26	4.80				
Newburyport			1888	26	2.59				
Northampton	1888	13.43							
Provincetown			1888	26	2.78				
Plymouth			1888	26	3.60				
Salem			1888	26	3.26				
Somerset			1888	26	2.75				
South Lee	1882	10.08							
Springfield	1882	12.73							
Springfield Armory	1882	11.40							
Thatcher's Island			1880	10	2.78				
Taunton			1888	26	4.33				
Vineyard Haven	1888	11.39	1888	25–26	6.00	1888	26	1 00	2.00
Westborough			1882	11–12	3.15				
Woods Holl	1888	11.27	1888	26	6.55				
Worcester	1882	10.01	1888	22	3.49				
Michigan.									
Adrian			1887	21	2.63				
Alpena			1881	23–24	2.50	1884	10	0 11	1.05
Do.			1886	8–9	2.75				
Detroit			1873	2–3	3.33				
Escanaba			1884	23–24	2.81				
Fort Brady			1881	26–27	2.83				
Do.			1882	14	3.28				
Grand Haven			1872	22–23	3.85	1875	11	0 58	1.10
Do.			1874	4–5	2.69	1880	3	1 00	1.02
Do.			1881	17	2.70				
Do.			1885	8–9	2.77				
Grand Rapids			1875	9	2.59				
Harrisville			1885	8	2.50				
Kalamazoo			1879	2–3	2.70				
Litchfield			1881	28	3.00				
Marquette	1881	12.71	1881	29–30	4.44	1881	29	1 00	1.00

Table showing for the month of September, &c.—Continued.

States and stations.	Rainfall of 10 inches, or more, per month.		Rainfall of 2.50 inches, or more, in 24 hours.			Rainfall equaling or exceeding one inch per hour.			
	Year.	Amt.	Year.	Day.	Amt.	Year.	Day.	Time.	Amt.
Michigan—Continued.		*Inches.*			*Inches*			*h. m.*	*Inches*
Niles			1879	26–27	3.10				
Minnesota.									
Beaver Bay	1869	10.70							
Chester			1884	23	2.66				
Duluth	1881	11.52	1881	28–29	2.88				
Hazlewood	1855	10.50							
Koniska	1869	10.00							
Minneapolis			1885	11	2.51				
Do.			1886	7	3.04				
Moorhead			1881	4	2.57				
Northfield	1881	10.27							
Fort Ridgely			1865	13	3.60	1865	13	2 50	3.60
Fort Ripley			1870	21	3.06				
Saint Paul			1881	29	2.68				
Fort Snelling	1881	10.54							
White Earth Reservation	1869	18.51							
Mississippi.									
Batesville			1885	6	2.87				
Do.			1886	14	2.66				
Do.			1888	1	2.55				
Brookhaven			1877	17–19	7.25				
Do.			1879	1	6.05				
Do.			1883	18	4.10				
Edwards	1885	12.15	1885	5	4.90				
Fayette	1877	11.20	1875	25	3.30				
Do.	1880	11.20	1877	18–19	6.20				
Do.			1879	1	3.00				
Do.			1879	13	3.70				
Do.			1880	7	2.90				
Do.			1881	7	3.00				
Do.			1881	14–15	3.00				
Grenada			1887	27	3.00				
Holly Springs	1868	11.90	1868	12	3.00				
Do.			1885	28	3.55				
Do.			1888	7	2.50				
Jackson	1885	10.32	1885	5	4.93				
Natchez			1887	27	2.50				
Okalona			1888	24	3.00				
Palo Alto			1888	22–23	3.60				
Vicksburg	1880	10.51	1874	25	2.95	1881	26	1 05	1.31
Do.			1875	17–18	4.99				
Do.			1879	1–2	3.97				
Do.			1880	1	5.24				
Do.			1881	14–15	3.85				
Do.			1884	3	2.69				
Missouri.									
Booneville	1884	10.13	1879	10	2.55				
Do.			1881	30	3.18				
Do.			1884	27	3.65				
Brunswick			1881	30	2.50				
Centreville			1856	27	2.80				
Conception			1884		2.63				
Corning			1879	11	3.30				
Dresden	1884	13.38							
Herman			1885	8	2.95				
Jerome			1885	13	3.42				
Do.			1886	27	3.50				
Kansas City			1885	4	3.25				
Lamar	1885	13.24	1885	4–5	2.60	1887	11	1 05	1.11
Do.			1885	7	6.97				
Pleasant Hill	1884	10.30							
Protem			1882	1	2.96				
Saint Joseph			1877	9	4.80				
Sedalia	1884	10.54							
Springfield	1884	10.54							
Saint Louis	1866	10.25	1847	7	2.75	1849	19	1 00	3.00
Do.			1849	19	3.00	1862	1	3 00	2.14
Do.			1866	13	2.50	1863	20	1 00	1.05
Do.			1876	5–6	2.87				
Do.			1876	6	3.19				
Do.			1878	8–9	2.51				
Do.			1885	3–4	3.47				
Do.			1886	4	2.62				
Montana.									
Fort Maginnis	1887	5.15	1887	1–2	3.30				
Nebraska.									
Clear Creek						1876	12	1 00	1.12
De Soto			1875	2	2.75				
Do.			1884	24	3.50				
Genoa	1887	11.34	1881	9–10	2.90				
Do.			1887	1	10.60				
Howard	1881	12.36	1881	28–29	5.80				
Nebraska City						1874	9	1 10	1.75
North Platte			1877	8	2.52	1877	25	1 05	1.93
Omaha			1881	28–29	5.29	1871	5	0 52	1.02
Do.						1874	26	1 00	1.01
Do.						1881	28	0 15	1.00
Do.						1884	26	1 00	1.00
Plattsmouth	1874	11.13	1875	1–2	2.80				
Do.			1874	13–14	3.80				
Sidney Barracks						1887	2	1 00	1.00
Nevada.									
Winnemucca	1882	1.28							
New Hampshire.									
Antrim	1888	10.45							
Ashland			1882	23	2.70				
Auburn	1882	10.00				1874	24	0 30	1.00
Belmont			1882	24	3.10				
Do.			1888	21–22	2.51				
Bristol			1882	23	2.70				
Concord	1888	10.97							

Table showing for the month of September, &c.—Continued.

States and stations.	Rainfall of 10 inches, or more, per month.		Rainfall of 2.50 inches, or more, in 24 hours.			Rainfall equaling or exceeding one inch per hour.			
	Year.	Amt.	Year.	Day.	Amt.	Year.	Day.	Time.	Amt.
		Inches.			*Inches*			*h. m.*	*Inches*
New Hampshire—Continued.									
Dunbarton	1868	16.40							
Grafton	1882	10.70	1882	23-24	2.60				
Hanover			1869	10	4.68				
Mount Washington	1873	13.66	1880	15	7.41				
Do	1875	11.34	1882	14-15	5.08				
Do	1876	14.89							
Do	1880	15.23							
Do	1882	13.32							
Wolfborough			1882	24	2.60				
Mine Falls	1888	10.13							
New Jersey.									
Atlantic City			1882	10-11	3.21				
Do			1883	11-12	3.85				
Acto	1882	13.65	1882	11-12	4.98				
Barnegat City	1882	14.65	1882	11-12	9.52				
Bordentown	1882	13.13	1882	22-23	7.35				
Do			1887	12	2.65				
Cape May			1877	7-8	4.71				
Do			1883	11	4.85				
Do			1883	11-12	4.22				
Clayton			1887	12	2.86				
Freehold	1882	11.61	1882	22-23	6.05				
Do			1888	8-9	3.11				
Gillette	1888	10.34							
Harrisville			1887	12	2.70				
Highland Park			1888	8-9	3.63				
Hopewell			1888	9-10	3.10				
Imlaystown			1887	12	2.60				
Do			1888	9-10	2.85				
Lambertville	1850	13.10	1847	24-25	3.53	1865	13	1 00	1.33
Do			1850	2	8.00				
Do			1860	30	4.48				
Do			1862	13	3.22				
Do			1888	8-9	2.59				
Little Egg Harbor			1882	11-12	4.07				
Do			1887	12	3.95				
Moorestown	1882	11.71	1882	22-23	6.96				
New Brunswick			1888	8-9	3.42				
Do			1888	8-9	2.98				
Ocean City			1888	10-11	2.50				
Oceanic	1888	10.65	1888	9	4.50				
Paterson	1882	25.98	1882	21-22	17.90				
Pequannock	1882	12.89	1882	21-24	9.94				
Plainfield			1888	11-12	3.10				
Readington	1882	12.30	1882	21-23	9.00				
Salem			1887	11	2.90				
Sandy Hook	1874	11.30	1882	11-12	4.77				
Do	1882	11.48	1882	21-22	4.37				
Somerville	1882	11.05	1882	22-23	7.69				
South Orange	1882	14.45	1882	23	7.50				
Trenton			1888	8	2.69				
Vineland	1882	12.35	1882	10-12	6.06				
New Mexico.									
Silver City	1880	5.67	1880	21	2.80				
Lava	1886								
New York.									
Ardenia			1888	16-17	4.27				
Albany			1882	22-23	4.16				
Boyd's Corners	1886	10.77	1886	7-8	3.45				
Do			1888	17-18	4.96				
Cooper Union			1874	17	5.10				
Do			1876	17	2.80				
Flushing	1882	11.71	1882	23-24	5.27				
Fort Columbus	1882	15.43							
Fort Niagara						1875	2	1 00	1.00
Moriches			1880	9	2.61				
New York City	1882	14.51	1874	17-18	3.95	1878	5	1 00	1.00
Do			1876	17	3.63	1882	11	1 00	1.08
Do			1882	11-12	3.32	1882	22	0 25	1.00
Do			1882	22-23	6.17	1882	23	1 00	1.90
West Point	1882	13.90	1882	21-22	5.80				
Do			1888	17-18	3.80				
White Plains			1882	23	3.35				
Southeast Reservoir	1888	10.05							
North Carolina.									
Ashville	1888	11.14	1888	6	3.07				
Attaway Hill	1874	10.19	1874	28-29	6.05				
Do			1876	20-21	3.18				
Cape Lookout	1876	14.09	1877	27-29	8.96				
Do	1877	16.32	1879	20-21	5.06				
Charlotte			1882	10	3.64				
Do			1884	11-12	6.56				
Do			1885	21-22	2.86				
Do			1888	9-10	3.41				
Elsworth	1880	15.50	1880	1	5.00				
Do	1881	26.50	1881	14	6.00				
Do			1881	15-16	13.00				
Fayetteville			1878	11-12	4.00				
Fort Johnson	1873	13.73	1876	15	3.00				
Do	1876	10.55	1876	16-17	4.00				
Fort Macon	1883	12.69	1881	14	2.68				
Do			1884	12-13	5.51				
Do			1885	21	6.02				
Franklin	1881	11.35							
Goldsborough	1876	13.62	1875	10	2.50				
Do	1877	16.70	1883	11	3.47				
Do	1883	10.39	1888	9	2.50				
Do	1888	13.10							
Greenville	1877	16.46	1877	27-29	8.30				
Hatteras	1876	11.69	1874	16	5.40	1875	11	1 10	1.30
Do	1877	15.41	1876	16	3.67	1875	28	1 00	1.17

Table showing for the month of September, &c.—Continued.

States and stations.	Rainfall of 10 inches, or more, per month.		Rainfall of 2.50 inches, or more, in 24 hours.			Rainfall equaling or exceeding one inch per hour.			
	Year.	Amt.	Year.	Day.	Amt.	Year.	Day.	Time.	Amt.
		Inches.			*Inches*			*h. m.*	*Inches*
North Carolina—Continued.									
Hatteras	1879	11.64	1877	20	3.10	1888	15	0 37	1.02
Do			1877	28	5.87				
Do			1879	21	5.25				
Do			1882	27-28	2.60				
Do			1883	10	3.50				
Do			1883	11	2.83				
Do			1885	21	5.60				
Do			1886	7-8	2.59				
Highlands	1880	12.66	1880	2-3	3.58				
Do	1881	13.40							
Kitty Hawk	1876	13.79	1877	20	2.65				
Do	1877	13.39	1877	28-29	7.25				
Do			1882	26	3.40				
Do			1885	21-22	4.60				
Lenoir	1888	10.80	1878	11-12	7.10				
Do			1887	29	3.10				
Lumberton	1883	12.50	1883	11	6.20				
Do			1884	13	3.06				
New Berne	1888	11.76	1884	12	2.90				
Do			1888	6	2.54				
New River Inlet			1883	10-11	5.92				
Do			1884	11-13	8.42				
Do			1885	21-22	5.29				
Oxford			1874	28	4.50				
Portsmouth	1877	12.74	1880	9	3.40	1880	1	0 30	1.20
Do	1883	11.24	1884	12	7.00				
Raleigh	1888	10.88	1886	9	2.56				
Do			1888	8-9	2.73				
Scott's Hill	1883	14.63	1883	10-11	6.82				
Do			1883	19	3.96				
Southport	1877	11.87	1883	10-11	5.23	1878	5	1 00	2.35
Do			1885	21	6.51				
Do			1888	7	3.40				
Statesville	1888	13.64	1887	29	3.65				
Do			1888	9-10	5.27				
Do			1888	15-16	4.07				
Weldon	1886	10.56	1881	9	3.07				
Do			1883	11	4.18				
Do			1883	12	3.00				
Do			1888	3-4	3.81				
Wilmington	1877	20.10	1872	13	4.12	1883	....	7 02	7.82
Do	1883	16.53	1873	23	2.67				
Do			1874	14	3.61				
Do			1874	15	3.75				
Do			1876	16	3.97				
Do			1877	1	4.99				
Do			1877	12	3.40				
Do			1877	27	5.64				
Do			1878	11	3.99				
Do			1879	20	3.00				
Do			1880	10	7.30				
Do			1883	14	4.88				
Do			1884	12	6.77				
Do			1885	21	4.77				
Ohio.									
Bellefontaine			1876	1	3.30				
Camp Dennison			1864	3-4	4.80				
Cleveland	1878	9.30	1877	1	2.73				
Do			1878	12-13	3.63				
Do			1878	12-13	4.44				
College Hill			1888	15-16	3.75				
Haverly			1886	23	3.25				
Hudson			1876	11-13	5.85				
Marietta			1878	13	4.58				
North Lewisburg			1884	27-28	5.40				
Do			1885	8	2.70				
Do			1886	23	2.60				
Portsmouth			1837	8	3.30				
Do			1839	8	3.10				
Ruggles			1883	21	4.50				
Sidney			1886	23	5.57				
Springborough			1885	8	2.97				
Springfield			1885	8	3.75				
Toledo						1881	2	1 10	1.82
Do						1881	3	1 10	2.04
Do						1886	5	1 20	1.37
Upper Sandusky			1885	8	3.25				
Waynesville			1885	8	2.70				
Oregon.									
Astoria			1887	30	2.70				
Mount Angel	1886	19.17	1886	4-5	5.24				
Do			1886	22-25	11.87				
Pennsylvania.									
Alleghany Arsenal			1861	26-27	3.00				
Bethlehem			1888	17	4.70				
Blooming Grove			1878	3	3.00				
Brownsville			1876	18	3.39				
Carlisle	1876	11.34	1863	17	2.50				
Do			1867	5	3.30				
Do			1870	30	4.50				
Easton	1888	11.75							
Egypt			1878	4	4.20				
Erie			1876	17-18	4.40				
Do			1878	11-12	2.70				
Do			1882	21-22	3.40				
Fallsington	1882	12.35	1882	23	4.94				
Do			1888	9	3.11				
Forks of Neshaminy			1888	18	3.11				
Franklin			1876	18	2.63				
Frederick			1888	17	2.76				
Freeport			1876	18	2.66				

Table showing for the month of September, &c.—Continued.

States and stations.	Rainfall of 10 inches, or more, per month.		Rainfall of 2.50 inches, or more, in 24 hours.			Rainfall equaling or exceeding one inch per hour.			
	Year.	Amt.	Year.	Day.	Amt.	Year.	Day.	Time.	Amt.
Pennsylvania—Continued.		*Inches.*			*Inches*			h. m.	*Inches*
Freeport			1888	26	3.32				
Germantown			1887	12	2.76				
Gerardville			1888	8	2.55				
Hamilton			1888	12	3.50				
Lansdale			1888	18	2.92				
New Castle	1878	10.00	1878	13	5.00				
Ottsville			1888	18	3.18				
Philadelphia	1882	12.09	1876	16-17	3.48	1882	21	0 25	1.20
Do			1882	22	4.65	1888	21	1 00	1.35
Do			1882	23	3.72				
Do			1887	11	2.63				
Pittsburg			1876	17-18	4.08				
Do			1878	12-13	3.88				
Quakertown			1888	17	2.72				
Scisholtzville			1888	18	3.13				
Smith's Court			1888	18	2.73				
Tarentum	1876	13.00	1876	17-18	6.00				
Wellsborough	1876	12.33	1887	12	2.60	1886	20	0 50	1.02
Do			1876	23-24	4.75				
West Chester			1882	22-23	4.50				
Do			1887	11-12	2.86				
Salem Corners			1888	12	3.50				
Rhode Island.									
Newport	1882	6.57	1882	11	3.87				
South Carolina.									
Abbeville	1888	13.66	1888	10	7.40				
Aiken			1881	16	2.60				
Allendale	1888	10.44							
Batesburg	1888	10.44	1884	11	2.88				
Do			1885	21	3.37				
Blackville			1884	11	3.37				
Do			1886	15	2.55				
Brewer's Mines	1888	13.48							
Cedar Springs	1883	11.60							
Charleston	1876	11.26	1873	19	2.66	1877	13	0 30	2.00
Do	1884	11.03	1874	28	3.89	1882	22	0 55	1.00
Do			1877	13	3.00				
Do			1878	11-12	4.26				
Do			1879	20-21	3.87				
Do			1884	9-10	2.68				
Do			1884	11-12	5.44				
Clinton	1888	16.26							
Columbia			1873	18-19	4.75				
Evergreen	1888	10.50							
Florence			1884	11	3.58				
Greenville			1888	10	2.60				
Greenwood	1888	17.90	1888	9	3.35				
Do			1888	10	8.35				
Hardeeville			1884	6	2.70				
Hilton Head			1864	20-21	4.15				
Jacksonborough	1888	11.83	1888	9	4.05				
Kingstree			1884	13	3.83				
Marion	1888	11.29							
Newberry	1888	17.90							
Saint Mathews			1882	4	3.38				
Do			1874	14-15	2.52				
Spartanburg	1888	20.44	1864	20-21	9.40				
Do			1874	27-28	2.90				
Do			1888	10	3.00				
Do			1888	7	3.55				
Do			1888	17	4.00				
Do			1888	16	2.50				
Statesburg			1883	14	3.52	1886	14	1 05	1.10
Do			1884	10-11	6.40				
Windsor	1888	11.49							
Winnsborough	1888	13.23							
Tennessee.									
Ashwood			1879	1-2	4.00				
Chattanooga			1885	20-21	2.58				
Do			1887	27-28	2.96				
Fostoria			1885	20	2.70				
Do			1887	27	4.00				
Grand Junction			1885	26	2.80				
Grief			1885	20	2.70				
Hohenwald			1885	29	2.53				
Knoxville	1877	7.38	1875	18	3.15	1871	15	0 40	1.00
Do			1877	10-11	2.65	1873	3	0 55	1.26
Do			1888	15-16	2.59				
Memphis			1871	13-14	2.88	1886	27	1 00	1.17
Do			1881	14-15	2.79	1887	22	1 05	1.19
Nashville			1877	17	2.93				
Do			1879	1	2.60				
Do			1881	15	4.21				
Do			1884	29	2.88				
Do			1885	29-30	3.01				
Do			1887	17-18	3.85				
Paris			1886	28	2.80				
Riddleton			1888	7	3.67				
Texas.									
Austin	1874	13.84	1866	9-10	2.90				
Do	1886	12.83	1873	12-13	6.45				
Do			1874	5-7	8.40				
Do			1874	7-8	2.90				
Do			1885	16	3.53				
Do			1886	12	5.07				
Do			1886	13	2.70				
Belton			1884	25	3.05				
Bluff Settlement	1874	17.20	1874	5-6	6.50	1874	19	2 00	2.00
Do			1874	25	4.75				
Brackettville			1881	29	2.52				
Brenham			1886	24	3.47				

Table showing for the month of September, &c.—Continued.

States and stations.	Rainfall of 10 inches, or more, per month.		Rainfall of 2.50 inches, or more, in 24 hours.			Rainfall equaling or exceeding one inch per hour.			
	Year.	Amt.	Year.	Day.	Amt.	Year.	Day.	Time.	Amt.
Texas—Continued.		*Inches.*			*Inches*			h. m.	*Inches*
Brownsville	1879	11.64	1876	19-20	2.77	1878	4	1 00	1.18
Do	1886	30.57	1879	13-14	2.76	1887	21	2 00	2.75
Do	1887	13.65	1879	24	3.90	1888	23	2 10	2.90
Do			1883	3-4	5.75				
Do			1884	20	3.02				
Do			1886	20-21	10.32				
Do			1886	21-22	11.91				
Do			1887	21	8.50				
Do			1888	23	2.90				
Clarksville	1874	10.00	1874	9	3.25	1874	9	3 00	3.25
Do			1874	24	4.00	1874	24	4 00	4.00
Do						1875	3	1 00	1.00
Cedar Hill			1888	18	3.00	1888	18	2 00	3.00
Columbia	1886	15.86	1885	19	3.04				
Do			1884	28	3.85				
Do			1886	23	2.80				
Do			1886	24	3.09				
Do			1887	27	2.85				
Columbus	1873	16.20				1873	19	3 00	4.00
Corpus Christi			1887	24	3.95	1888	23	1 27	1.80
Do			1888	23	2.82				
Do			1888	20-21	2.90				
Corsicana			1887	26	3.03				
Cuero			1886	13	3.55				
Decatur			1881	30	4.44				
Denison			1880	20	3.59				
Do			1880	26	2.52				
Eagle Pass			1880	13	3.50				
Do			1881	11	2.87				
Fort Brown	1869	10.50	1869	22	4.70				
Do	1873	15.35	1873	8-10	8.80				
Do	1874	10.96	1873	13-14	5.92				
Do			1874	3-5	10.14				
Do			1884	20-21	2.70				
Fort Clark	1874	11.06	1860	14	3.00				
Fort Concho			1880	20	3.50				
Do			1882	4-5	3.05				
Fort Elliott						1882	27	0 40	1.17
Fort Davis						1880	3	1 09	2.19
Do						1880	9	0 45	2.42
Fort Griffin			1877	3-4	2.51				
Do			1881	13	2.76				
Fort McKavitt	1874	10.97	1874	6-7	5.38				
Do			1874	22-23	3.70				
Do			1876	9-10	2.52				
Do			1877	4-5	3.31				
Fort Stockton	1880	13.30	1882	4-5	6.56				
Do	1883	14.68	1883	13	4.32				
Do			1883	17-19	7.91				
Fredericksburg	1880	12.25	1880	15	2.62				
Do			1880	22	3.13				
Galveston	1875	18.41	1873	13	3.27	1871	3	1 00	1.00
Do	1877	13.85	1875	15-16	6.37	1875	25	1 00	1.50
Do	1880	10.20	1875	16-17	3.96				
Do	1885	26.01	1875	24-25	6.56				
Do	1886	13.31	1876	23-24	2.83				
Do			1877	6	4.83				
Do			1877	16-17	6.07				
Do			1880	3-4	3.03				
Do			1884	27-28	3.02				
Do			1885	3-4	7.09				
Do			1885	15-16	3.79				
Do			1885	18-19	4.66				
Do			1885	19-20	4.34				
Do			1886	13-14	2.89				
Do			1888	22-23	2.59				
Hearne			1885	17	4.50				
Do			1886	13	4.00				
Do			1888	22-23	2.59				
Houston	1886	12.83	1886	24	4.90				
Do	1884	10.02	1883	7	5.10				
Do			1884	28	3.25				
Indianola	1874	12.89	1879	11	3.79	1880	7	0 25	1.27
Do	1875	10.65	1882	6	4.05				
Do	1885	10.36	1883	4	3.16				
Do			1884	27-28	6.98				
Jacksborough	1880	13.95	1880	20	3.00	1880	22	1 15	1.95
Do			1880	21	3.17				
Do			1881	30	3.27				
Luling			1882	7	2.64				
Do			1883	20	4.00				
Do			1886	14	3.00				
Mason	1880	10.39	1881	30	3.31				
Mesquite						1874	19	1 00	1.00
Do						1875	4	1 00	1.50
Melissa			1877	2-47	3.00				
Nelson			1881	30	4.00	1881	30	1 30	4.00
New Ulm	1874	15.08	1874	10	3.31	1874	10	3 15	3.31
Do	1875	13.49	1874	25	2.88				
Do			1883	20	3.29				
Palestine			1886	23-24	4.44				
Paris			1886	28	2.80				
Presidio			1882	4-5	2.68				
Pilot Point			1877	5	3.87				
Do			1880	20	5.29				
Rio Grande City			1879	25-26	2.97	1879	26	0 35	1.93
Do			1879	26-27	2.86	1884	11	1 00	1.12
Do			1881	7-8	2.90	1888	12	1 59	2.25
Do			1883	7	2.51				
Do			1884	10	5.04				
Do			1886	21-22	2.73				

Table showing for the month of September, &c.—Continued.

States and stations.	Rainfall of 10 inches, or more, per month.		Rainfall of 2.50 inches, or more, in 24 hours.			Rainfall equaling or exceeding one inch per hour.			
	Year.	Amt.	Year.	Day.	Amt.	Year.	Day.	Time.	Amt.
Texas—Continued.		*Inches.*			*Inches*			h. m.	*Inches*
Rio Grande City			1887	21-22	2.55				
San Antonio			1881	11	3.09				
Do.			1882	6	6.20				
Sour Lake			1882	15-16	6.10				
Do.			1886	24	3.70				
Waco			1886	13	3.10				
Longview			1885	9	3.94				
Utah.									
Salt Lake City	1876	3.13							
Vermont.									
Brattleborough	1888	10.56	1888	18	2.51				
Charlotte			1885	10	2.50				
Manchester			1886	20-21	2.57				
Strafford			1881	2-3	2.50	1874	24	1 00	2.00
Do.						1874	16	1 00	1.10
Vernon	1888	10.94							
Virginia.									
Accotink			1877	12	2.50				
Bruington			1886	9-10	3.50				
Cape Henry	1876	14.90	1887	29	2.60				
Do.	1877	10.04							
Capeville	1876	10.70	1876	16-17	6.00				
Dale Enterprise	1882	12.24							
Lynchburg	1888	10.56	1871	15	3.42				
Mount Solon			1878	10-11	3.10				
Norfolk	1877	11.90	1873	9-10	3.12	1877	31	1 00	1.00
Do.			1876	15-16	3.22				

Table showing for the month of September, &c.—Continued.

States and stations.	Rainfall of 10 inches, or more, per month.		Rainfall of 2.50 inches, or more, in 24 hours.			Rainfall equaling or exceeding one inch per hour.			
	Year.	Amt.	Year.	Day.	Amt.	Year.	Day.	Time.	Amt.
Virginia—Continued.		*Inches.*			*Inches*			h. m.	*Inches*
Norfolk			1882	25-26	4.22				
Do.			1883	10-11	2.66				
Do.			1885	21-22	2.78				
University of Virginia	1888	13.10							
Woodlawn			1877	11-12	3.50				
Wytheville			1878	12	7.02				
Washington.									
Neah Bay	1885	12.15							
West Virginia.									
Wellsburg			1883	20	4.50	1883	20	2 15	4.50
Wheeling			1886	28	2.75				
Morgantown	1882	7.23							
Wisconsin.									
Beloit			1875	8-9	6.10				
Do.			1880	18-19	2.82				
Bloomfield			1875	8-9	4.85				
Embarras	1881	11.60							
Green Bay			1888	16-17	3.98				
La Crosse	1881	10.87	1875	31	2.74				
Do.	1884	10.01	1876	9	2.81				
Do.			1884	6	5.69				
Lincoln			1888	16	4.00				
Milwaukee			1872	22-23	3.74				
Neillsville	1881	14.01	1880	18	3.90				
Do.			1881	29	3.70				
Wyoming.									
Fort Fetterman	1881	4.20		5	2.60				

WINDS.

The prevailing winds for September, 1888, are shown on chart II by arrows flying with the wind. Along the Atlantic coast south of New England, and in the Gulf states and lower and middle Mississippi valleys, northerly winds were most frequently noted; along the Saint Lawrence Valley and over the Lake region they were mostly westerly; in the Missouri Valley, northwest; in the Rocky Mountain regions, variable; and along the Pacific coast, north to west.

HIGH WINDS.

No velocities of fifty miles or more per hour have been reported, other than those given in the table of miscellaneous meteorological data, except at Mount Washington, N. H., 80, sw., 8th, and 86, sw., 13th.

LOCAL STORMS.

The severe storms in the south Atlantic and east Gulf states during the first decade of the month, and the heavy gales along the middle Atlantic and New England coasts on the 25th and 26th, attended the passage of barometric depressions described in this REVIEW. The following reports refer to storms of a more local character:

8th. *Illinois.*—Quincy: a severe rain and wind storm in the evening did much damage. Houses were unroofed and trees damaged. The storm lasted about ten minutes and was unusually destructive.

10th. *Virginia.*—Norfolk: a destructive wind and rain storm swept over parts of Nansemond, Isle of Wight, and Southampton counties this morning, destroying trees and crops and demolishing buildings.

14th. *Maryland.*—Westport, Prince George Co.: this section was visited in the afternoon by a cyclonic storm about one-fourth of a mile in width which caused much damage.

14–15th. *California.*—San Francisco: heavy showers of rain, accompanied by thunder and lightning, prevailed.

15th. *South Carolina.*—Tumbling Shoals, Laurens Co.: a tornado swept over this place at 6 p. m., doing much damage to trees. Toney Creek, Anderson Co.: about 5 p. m. a tornado passed across Saluda River one mile south of this place, unroofing houses.

16th. *District of Columbia.*—Washington City: the thunder-storm which occurred in the afternoon was accompanied by high wind and excessive rain; 1.23 inches of rain fell in twenty-five minutes; several houses in the southern portion of the city were unroofed or otherwise damaged. *New Jersey.*—Hurffville, Gloucester Co.: a storm visited this place between 7 and 8 p. m., doing much damage to houses, crops, and stock.

17th. *Delaware.*—Viola, Kent Co.: a destructive storm passed over this county from southwest to northeast; it lasted only about two minutes, but did considerable damage.

20th. *Kansas.*—Dodge City: occasional flashes of lightning were observed at sunset; at 8.05 p. m. the wind backed from northeast to northwest and for twelve minutes blew at the rate of forty miles an hour; hail of unusual size fell from 8.15 to 8.40 p. m., causing much damage; the storm ended at 9.10 p. m. *Virginia.*—Lynchburg: a storm passed over Orange county, destroying houses, trees, and stock.

21st. *South Carolina.*—Tabernacle, Marion Co.: a tornado passed over this place at 6.30 p. m., velocity of wind sixty-five miles an hour from the east; storm lasted from three to five minutes; width of track about three hundred yards. *Texas.*—Mammoth Springs, Fulton Co.: a tornado passed over this place to-day; seven houses were wrecked; trees and crops badly damaged, and several people were injured.

26th. Heavy gales and rain storms prevailed over New England, more especially along the coast, where considerable damage was done to shipping and property.

Destructive hail storms were reported as follows:

7th. *Minnesota.*—Saint Paul: during a thunder-storm in the afternoon hail of unusual size fell to a depth of one-half inch.

12th. *New York.*—Nyack: a severe hail storm occurred in the interior of Rockland county at night; hail-stones the size of walnuts fell. *Pennsylvania.*—Johnstown, Cambridge Co.: a severe thunder and hail storm occurred in the evening; hail fell in large quantities and was very destructive to window-glass, grapes, and late vegetables; in protected places it remained on the ground twenty-four hours. Several buildings were struck by lightning. Washington, Washington Co.: a destructive hail storm occurred at 6 p. m.

20th. *Kansas.*—Dodge City: hail of unusual size fell from 8.15 to 8.40 p. m. during a thunder storm.

27th. *New York.*—Eden Centre: a very severe hail storm, accompanied by thunder and lightning, passed over this place from the southwest. The stones were about the size of chestnuts; the storm lasted one hour.

INLAND NAVIGATION.

STAGE OF WATER IN RIVERS AND HARBORS.

Saint Paul, Minn.: the steamer "Mary Morton," drawing about three feet of water, was unable to reach this place on the 2d on account of low water in the Mississippi River.

The steamer "Sidney" arrived from Saint Louis on the 24th, she was the first of the regular through boats to arrive here since the close of last month.

Chattanooga, Tenn.: boats of low draught resumed their regular trips on the Tennessee River on the 3d.

In the following table are shown the danger-points at the various stations, the highest and lowest depths for September, 1888, with the dates of occurrence and the monthly ranges:

Heights of rivers above low-water mark, September, 1888 (in feet and tenths).

Stations.	Danger-point on gauge.	Highest water.		Lowest water.		Monthly range.
		Date.	Height.	Date.	Height.	
Red River:						
Shreveport, La	29.9	15	12.4	1	5.2	7.2
Arkansas River:						
Fort Smith, Ark	22.0	1	13.3	27, 28	1.2	12.1
Little Rock, Ark	23.0	3	14.4	30	2.4	12.0
Missouri River:						
Omaha, Nebr	18.0	1, 2	8.4	29, 30	6.3	2.1
Leavenw'rth, Kans.	20.0	1	10.7	29, 30	6.6	4.1
Mississippi River:						
Saint Paul, Minn	14.5	10, 11, 15, 16, 18, 19	3.3	6, 7	2.8	0.5
La Crosse, Wis	24.0	1	4.7	16, 27, 30	3.7	1.0
Dubuque, Iowa	16.0	1	5.0	18	3.3	1.7
Davenport, Iowa	15.0	1	3.9	21, 30	2.0	1.9
Keokuk, Iowa	14.0	1	3.9	20, 21	1.6	2.3
Saint Louis, Mo	32.0	1	12.7	29, 30	6.2	6.5
Cairo, Ill	40.0	1	24.1	30	13.1	10.0
Memphis, Tenn	34.0	3	20.0	27	11.6	8.4
Vicksburg, Miss*	41.0	9	25.0	30	14.1	10.9
New Orleans, La	13.0	24, 25	7.5	29, 30	4.8	2.7
Ohio River:						
Pittsburg, Pa	22.0	9	10.6	8	2.1	8.5
Parkersburg	.....	17	12.5	30	4.0	8.5
Cincinnati, Ohio	50.0	21	22.2	30	9.4	12.8
Louisville, Ky	25.0	23	8.9	30	6.2	2.7
Cumberland River:						
Nashville, Tenn	40.0	10	20.3	22	2.9	17.4
Tennessee River:						
Chattanooga, Tenn	33.0	19	11.5	1	3.5	8.0
Monongahela River:						
Pittsburg, Penn	29.0	9	10.6	8	2.1	8.5
Savannah River:						
Augusta, Ga	32.0	11	38.7	30	10.5	28.2
Willamette River:						
Portland, Oregon	.....	5	5.1	25, 28	1.2	3.9

FLOODS.

The excessively heavy rainfalls in the south Atlantic and east Gulf states during a greater portion of the first and a part of the second decade of the month caused destructive freshets. Lowlands were inundated and great damage was caused to the cotton crops.

Flemingsburg, Flemings Co., Ky.: a cloud-burst washed out trestling, bridges, and fills, on the Cincinnati and Southwestern Railroad between this place and Hillsborough on the 1st. The greatest loss fell on the tobacco planters.

Charleston, W. Va.: a flood in the New River on the 5th carried away a large iron bridge on the Chesapeake and Ohio Railroad at Grand View, involving a loss of $50,000. Other damage was also reported.

Hot Springs, Ark.: a destructive cloud-burst occurred on the 7th at 11 p. m., advancing from the northwest. The rain fell in torrents for two hours. Hotels were flooded to a depth of four feet; many buildings were torn down; five lives were lost, and several persons were missing. Damage to property estimated at $100,000. Wilmington, N. C.: heavy rains for eight days previous to the 7th caused serious injury to the cotton crop, and the lowlands were inundated by the overflow of the Cape Fear River.

Columbus, S. C.: advices of the 8th state that the crops along the Congaree River have been damaged by the floods to the extent of $1,000,000. The river rose twenty feet above low water mark.

Augusta, Ga., 10th: a flood is now desolating this city. The streets are filled with water to a depth of several feet, causing an entire suspension of business. In the freshet of 1840, the severest previously experienced, the water did not reach its present height by fifteen inches.

Danville, Va., 10th: dangerous floods were reported along the Dan River.

Atlanta, Ga.: the rain-storm of the 15–16th caused the heaviest rainfall in twenty-four hours (6.23 inches) that has occurred since the establishment of the Signal Service station in 1878. Great damage was done to the cotton crop and by washing out of railroads.

Port Jervis, N. Y.: the Delaware River overflowed on the 17th, causing much damage along its banks and along the line of the Delaware and Hudson Canal.

Newburg, N. Y.: heavy rain fell during the night of the 17–18th. Land slides and washouts occurred on the railroads; at Middletown, N. Y., heavy rains caused washouts along the lines of railroads centring at that place.

Waupaca, Waupaca Co., Wis.: on the 18th high water caused damage amounting to $38,000.

Easton, Pa.: reports of the 18th show that much damage was caused to railroads and private property by the heavy rains. Bridges were washed away, and railroad traffic was almost entirely suspended. Philadelphia, Pa.: the severe rain-storms which began on the 16th caused a flood in the Schuylkill. Much damage was done to property.

Laredo, Tex.: a cloud-burst occurred on the night of the 20th twenty-eight miles above this place, in the vicinity of the Santa Loma coal mines. The Rio Grande River rose eight feet, and the tracks of the Rio Grande and Eagle Pass Railroad were badly washed.

Paterson, N. J.: advices of the 21st state that enormous damage was caused along the Passaic River by heavy rains. Houses, stock, and crops were swept away by the flood.

Pittsfield, Mass.: on the 21st thousands of acres of meadow land on the Housatonic R. R. between Great Barrington and Sheffield were flooded as the result of the heavy rains.

HIGH TIDES.

Southport, N. C.: 10th, 12th, 15th, 20th, 24th. Galveston, Tex.: 6th, 7th. Key West, Fla.: 6th.

ATMOSPHERIC ELECTRICITY.

AURORAS.

Numerous feeble auroral displays were observed at various places in Dakota, Minnesota, and Wisconsin from the 7th to the 9th, and from the 11th to the 15th, none of which were of a noteworthy character except one seen at Fort Buford, Dak., on the 14th, of which the following report has been made: an aurora in the form of "merry dancers" began 1.48 a. m.; it consisted of luminous straw and white colored beams which reached an altitude of 45° and covering 60° of the horizon. The display ended 5.25 a. m.

Auroras were observed during the month as follows: 1st, Fort Buford, Dak., Saint Vincent, Minn. 2d, Moorhead, Minn. 7th, Garden City, Dak. 8th, Saint Vincent, Minn. 9th and 11th, Webster, Dak., Saint Vincent, Minn. 12th, Webster, Dak., Moorhead, Minn., Deuster, Wis. 13th, Independence, Iowa, Moorhead, Minn., Madison, Wis. 14th, Fort Buford, Dak., Madison and Weston, Wis. 15th, Webster, Dak. 17th, Poplar River, Mont. 24th, Cornish, Me. 26th, Cornish, Me., Wellsborough, Pa. 28th, Davenport, Dak., Hamilton, Pa. 29th, Orono, Me.

THUNDER-STORMS.

The accompanying table shows that thunder-storms were most frequently reported during the month in Florida, where their occurrence was noted on twenty-four days, and that no thunder-storms were observed in Maine. In New York, Iowa, Kansas, and Arizona they were reported on fifteen days; in the District of Columbia, New Hampshire, Rhode Island, and Idaho, on one day only; while in Vermont, Connecticut, Massachusetts, Maryland, Virginia, West Virginia, Indiana, Louisiana, Montana, Utah, New Mexico, Washington Territory, and Wyoming they were observed on less than five days. In California they were reported on thirteen days. They occurred in the largest number of states and territories (twenty-three) on the 13th; in nineteen on the 20th, and in from ten to eighteen, inclusive, daily from the 1st to the 12th, and on the 14th, 15th, 16th, 18th, 19th, 21st, and 22d. During each of the last eight days of the month they were observed in less than ten of the states and territories, the dates of their minimum occurrence being the 23d and 24th. As there are no stations of observation in Delaware, no reports of thunder-storms have been received from that state.

Table showing the number of stations in the several states and territories reporting thunder-storms for each day during September, 1888.

State or Territory.	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.	17.	18.	19.	20.	21.	22.	23.	24.	25.	26.	27.	28.	29.	30.	31.	Total No. of days.
Alabama	1	1	1	1	1	2	1	....	1	....	1	....	2	2	....	....	....	....	....	....	....	2	2	....	....	....	....	....	....	....	....	13
Arizona	1	3	2	1	2	2	....	1	....	....	....	....	....	....	2	....	2	5	1	....	....	3	....	....	1	....	1	....	....	1	....	15
Arkansas	....	....	....	....	1	....	....	....	....	....	....	....	1	1	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	4
California	....	1	2	1	....	....	....	....	....	1	3	....	....	9	6	4	3	....	....	....	....	1	....	1	2	....	....	1	....	....	....	13
Colorado	4	....	....	....	....	1	....	....	....	1	3	....	1	....	....	....	....	4	3	....	....	....	....	....	....	....	....	....	....	....	....	7
Connecticut	....	....	....	....	....	....	....	....	....	....	....	2	3	....	....	....	....	....	....	....	2	....	....	....	....	....	....	....	....	....	....	3
Dakota	....	....	....	....	1	6	....	....	1	....	....	1	2	3	....	....	....	1	2	....	....	1	....	....	....	....	....	1	....	1	....	11
District of Columbia	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1
Florida	6	4	3	2	....	2	3	2	3	2	2	4	3	5	4	3	....	1	1	2	1	....	1	1	1	2	1	....	....	....	....	24
Georgia	2	2	2	2	....	....	....	1	....	....	1	....	....	1	....	....	....	1	....	....	3	4	....	....	....	....	....	....	....	....	....	10
Idaho	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1
Illinois	2	....	....	....	....	....	5	5	1	2	1	....	....	3	....	7	....	....	....	1	7	....	....	....	....	....	....	....	....	....	....	10
Indiana	....	....	....	....	....	....	....	....	....	....	....	....	....	....	3	1	....	....	....	5	5	....	....	....	....	....	....	....	....	....	....	4
Indiana Territory	....	....	....	....	....	....	....	....	....	....	....	2	1	2	....	....	....	1	....	2	....	1	....	....	....	....	....	1	1	....	....	8
Iowa	....	1	5	8	....	1	18	1	1	11	11	....	1	12	6	2	....	....	....	3	13	....	....	....	....	....	....	....	....	....	....	15
Kansas	1	2	....	....	....	1	3	....	1	2	3	7	2	2	....	....	....	2	2	4	7	5	....	....	....	....	....	....	....	....	....	15
Kentucky	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....	....	2	2	....	....	....	....	....	....	....	....	....	....	3
Louisiana	....	....	....	1	....	....	....	1	1	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....	5
Maine	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	.....
Maryland	1	....	....	....	....	....	....	....	....	....	1	1	....	....	....	3	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	4
Massachusetts	....	....	....	....	....	....	....	....	....	....	....	....	7	....	....	....	....	....	....	3	8	....	....	1	....	9	....	....	....	....	....	5
Michigan	....	....	....	....	....	....	4	5	1	2	8	3	....	....	4	9	....	....	....	....	....	....	....	....	....	3	....	1	4	....	....	11
Minnesota	....	2	2	....	1	2	9	....	....	8	....	....	1	3	1	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	10
Mississippi	2	1	1	....	1	....	....	....	....	....	1	....	1	....	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	7
Missouri	....	....	....	....	....	....	....	....	1	....	1	1	....	2	1	....	....	....	....	....	3	1	....	....	....	....	....	....	....	....	....	7
Montana	....	....	1	....	1	....	....	....	....	....	....	....	2	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	3
Nebraska	....	....	....	....	....	1	2	....	1	1	2	1	....	1	....	....	....	1	3	....	....	....	....	....	....	....	....	1	....	....	....	9
Nevada	....	....	....	....	....	....	....	....	1	....	....	1	1	....	1	....	1	....	....	....	....	....	....	....	....	1	....	....	1	....	....	8
New Hampshire	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	2	....	....	....	....	....	....	....	....	....	....	....	1
New Jersey	....	....	....	....	....	1	....	8	....	....	....	2	3	....	....	2	....	1	....	2	2	....	....	....	....	....	....	....	3	1	....	10
New Mexico	....	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....	....	1	....	1	....	....	....	....	....	....	....	....	....	....	....	3
New York	....	....	....	2	1	....	....	1	1	....	....	5	3	....	....	....	1	2	....	6	3	1	....	....	....	....	3	1	2	3	....	15
North Carolina	1	1	1	1	....	1	2	....	....	....	....	....	....	....	....	....	....	....	....	....	2	....	....	....	....	....	....	1	....	....	....	7
Ohio	....	....	....	3	....	....	....	....	....	....	1	7	1	....	4	....	....	....	1	3	....	....	....	....	....	....	1	1	3	2	....	11
Oregon	....	....	1	....	....	....	....	1	....	....	....	2	....	3	....	....	....	....	....	....	....	....	....	....	....	....	2	5	7	1	....	8
Pennsylvania	....	....	....	1	....	....	....	3	3	....	....	22	2	....	....	4	....	....	1	6	1	....	....	....	....	....	....	3	1	3	....	12
Rhode Island	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1
South Carolina	3	2	....	1	1	1	....	....	1	....	....	....	1	1	1	....	....	1	....	....	2	1	....	....	....	....	....	....	....	....	....	12
Tennessee	....	....	3	2	....	1	....	....	1	....	....	1	....	1	1	....	....	....	1	1	2	2	....	....	....	....	....	....	....	....	....	11
Texas	....	....	....	....	....	....	3	6	5	4	3	5	2	3	....	....	1	....	....	5	1	2	....	....	....	....	....	....	....	....	....	12
Utah	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	1	....	....	....	....	....	....	....	....	....	....	....	1	....	3
Vermont	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....	....	1	....	....	6	1	....	....	....	....	....	....	....	....	....	....	4
Virginia	3	....	....	....	1	....	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	1	....	....	....	....	....	....	4
Washington	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	2
West Virginia	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	2
Wisconsin	....	....	....	....	....	....	6	....	1	6	4	....	....	....	....	1	1	....	....	....	....	....	....	....	1	....	....	....	....	....	....	7
Wyoming	1	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	3
Number of States reporting	13	11	12	15	11	13	11	12	17	11	17	18	23	17	13	13	8	14	10	19	18	13	3	3	5	4	5	9	7	9		

MISCELLANEOUS PHENOMENA.

DROUGHT.

Chicago, Ill., 8th: reports from central and western Michigan state that the corn crop has been severely injured by the long drought.

Lamar, Mo., 10th: farmers report that the dry weather has been very injurious to the fall pastures.

Detroit, Mich., 12th: the continued drought has been very injurious in this part of the state, especially in Wayne, Oakland, and Macomb counties, the corn, of which there was an unusually large acreage this season, is burned and shriveled, with ears only partly matured; a general heavy rain fell in all sections of state on 15th, 16th, and 17th, breaking the drought.

Monument City, Huntington Co., Ind.: the rain which fell on the 15th was the first since the 2d of August; the dry weather has been very damaging to the agricultural interests in this section.

Moorhead, Minn., 17th: on account of the drought the ground has become so hard that farmers have been unable to commence plowing.

Huron, Beadle Co., Dak., 27th: farmers report that rain is very much needed for fall work, the ground has not been dry to such a great depth in nine years.

Tiffin, Seneca Co., Ohio, 30th: on account of the protracted drought, the Baltimore and Ohio Railway Company was running water trains during the first half of the month to different points west of this place.

FOREST AND PRAIRIE FIRES.

Los Angeles, Cal., 7th: a large fire is reported in the Little Santa Anito Cañon, east of Sierra Madre.

Aberdeen, Brown Co., Dak., 7th: reports state that prairie fires are raging in McPherson and Edmonds counties; a large number of farmers have lost their farm houses and entire crops.

Escanaba, Mich., 12th: forest fires are burning at the edge of the town.

Deep River, Arenac Co., Mich., 12th: fires are reported along the Michigan Central Railroad, causing great damage to houses, fences, etc.

Standish, Arenac Co., Mich., 15th: forest fires are observed in all directions from this place.

Portland, Oregon, 15th: prairie fires are raging along the Columbia River northeast of this city; numerous homes of settlers and two or three railroad bridges have been burned.

Bismarck, Dak.: prairie fires burned over the entire south-

ern portion of Campbell county on the 20th; they were also burning north and east of this place on the 30th.

Huron, Dak., 27th: disastrous prairie fires are reported north of this place, especially in Faulk and Cotean counties.

McMinnville, Yamhill Co., Oregon, 30th: the sky has been darkened by smoke from forest fires in the surrounding country throughout nearly the entire month.

Webster, Day Co., Dak., 30th: prairie fires have been of general occurrence in this section during the month.

Forest and prairie fires were also reported during the month as follows: Red Bluff, Cal., 1st to 7th, 11th, 24th, 27th; Fort Assinaboine, Mont., 1st, 2d, 17th, 18th, 25th to 27th; Boisé City, Idaho, 2d, 15th, 17th, 21st, 25th; Green Bay, Wis., 6th; Poplar River, Mont., 9th; Fort Reno, Ind. T., 10th; Fort Canby, Wash., 11th, 14th; Deep River, Mich., 12th; San Diego, Cal., 14th to 16th; Port Huron, Mich., 16th; Fort Sill, Ind. T., 16th, 20th, 25th, 26th; Fort Sully, Dak., 24th, 30th; Jamestown, Dak., 27th; Ashland, Oregon, 27th to 29th.

HALOS.

Solar halos were most frequently reported in New York and Tennessee, where they occurred on eleven days. In Illinois and Massachusetts they were noted on nine days. Over other sections of the country they were sparsedly distributed through the month, and to the westward of the one hundredth meridian none were noted, save in the northern plateau region and on the Pacific coast. The dates of greatest occurrence were the 3d, 6th, 25th, and 30th, and of the least the 1st and 27th. On the 23d no solar halos were reported. Lunar halos were observed with the greatest frequency in Mississippi, North Carolina, and Tennessee, where they were reported on eight dates. They were nearly as numerous in Illinois, New Jersey, South Carolina, and Virginia. Between the Mississippi Valley and the Pacific coast no lunar halos were reported, except in Nebraska, Nevada, and Arizona, where they were observed, respectively, on two dates. On the Pacific coast they were noted in California on two dates and in Oregon on one date.

The date of their most general occurrence was the 15th, when they were reported from fifteen states and territories. On the 1st, 2d, 3d, 5th to 7th, and 26th to 29th, no lunar halos were reported.

The phases of the moon, Washington mean time, during September, as given in "The American Ephemeris and Nautical Almanac," are as follows: new moon, 5th, 11h. 47.9m.; first quarter, 12th, 4h. 51.7m.; full moon, 19th, 12h. 16.1m.; last quarter, 27th, 15h. 22.0m.; perigee, 8th, 18.0h.; apogee, 24th, 14.0h.

METEORS.

Meteors have been most frequently reported in southwestern Michigan, southern Minnesota, northern Ohio, Illinois, Tennessee, and Texas, where they occurred on from four to eight dates. Their distribution, by dates, over the remaining sections of the country was as follows: Eastern Massachusetts, 26th; central New York, 14th, 23d; Maryland, 20th; northeastern Florida, 2d, 4th, 24th; central Georgia, 9th; Indiana, 5th; Kentucky, 19th, 29th; Iowa, 26th; Louisiana, 18th, 19th; Dakota, 2d, 12th, 17th; Arizona, 23d, 24th; Oregon, 5th; California, Keeler, 2d, 10th, 12th, 21st.

The following are the more notable meteoric displays reported:

Liberty Hill, Bienville, Co., La.: a bright meteor was observed to pass from the zenith in a westerly direction at 8 p. m., 18th; it was sufficiently bright to cause trees and other objects to cast shadows. About two minutes after it had passed out of sight a loud report was heard, the concussion of which was sufficiently strong to cause houses to tremble at Sparta, sixteen miles west of this place.

Globe, Gila Co., Ariz.: a brilliant meteor was observed at 6.30 p. m., 23d; it moved from southeast to northwest, and remained visible ten to fifteen seconds.

Fort Thomas, Ariz.: a large meteor was observed at 8.20 p. m., 24th, moving from southeast to north; it remained in sight about five or six seconds, when it burst into fragments similar to a sky-rocket; no detonation was heard.

Marquette, Mich., 4th: a meteor of great brilliancy was observed in the western sky about 40° from the zenith, approaching the earth almost at a right angle; at a height of about 50° it moved parallel with the earth a distance of 10° and then burst into several pieces. The display lasted eight seconds.

Shreveport, La.: a brilliant meteor was observed in altitude 45°, moving from the southeast to a little west of south, at 8.45 p. m., 19th; it appeared about twice the size of an ordinary sky-rocket; its light was violet, changing to white, and lastly to pink. It is reported that the same meteor was seen in several places south of this city.

MIRAGE.

Huron, Dak.: a distinct mirage was observed in all directions from sunrise until 9 a. m., 9th; villages ordinarily not visible at this place were clearly seen as though resting on slopes and hills of considerable elevation. This town appeared as though located in the centre of a natural basin of large area; Wessington Hills, a range of low elevation twenty-five miles distant, appeared as an elevated mountain range, trending from south to northwest, and assumed the peculiar tint of the Blue Ridge Mountains of Virginia and Tennessee; in fact the resemblance on account of various gaps and peaks was particularly striking.

Mirages were also observed as follows: Webster, Dak., 1st, 4th, 9th, 11th, 12th, 16th, 19th, 22d; Davenport, Dak., 2d, 4th, 9th, 28th, 29th; Woonsocket, Dak., 5th, 8th, 9th; Yuma, Ariz., 9th, 10th, 30th; Hampton, Iowa, 19th; Marquette, Nebr., 17th, 29th, 30th.

SAND STORMS.

Sand storms were reported as follows:

Fort Grant, Ariz., 10th to 12th, 18th; Fort McDowell, Ariz., 17th; Yuma, Ariz., 17th, 21st; Fresno, Cal., 14th; Needles, Cal., 25th.

SUN SPOTS.

Sun spots were observed during the month as follows:

John W. James, Reiley, McHenry Co., Ill.: two small spots first seen on the 7th on sun's meridan, vanished on the 12th or 13th. The large spot disappeared on the 9th, by the solar rotation, but failed to reappear when due on east edge. Another spot broke out east of sun's meridian on the 22d, disappearing by the solar rotation on the 28th.

H. D. Gowey, North Lewisburg, Champaign Co., Ohio: sun spots were observed from the 1st to the 14th, and from the 23d to the 28th, inclusive.

F. P. Leavenworth, director, Haverford College Observatory, Pa.:

Date. September, 1888.	Number.		Disappeared by solar rotation.		Reappeared by solar rotation.		Total number visible.		Remarks.
	Gr'ps	Spots	Gr'ps	Spots	Gr'ps	Spots	Gr'ps	Spots	
12, 9 a.m....	4	24	0	0	.....	.....	4	24	
13, 10 a. m ...	0	0	0	0	0	0	3	15	
14, 10 a. m ...	1	2	0	0	0	0	2	6	
18, 12 m	0	0	0	0	0	0	0	0	
19, 4 p. m...	0	0	0	0	0	0	0	0	Through clouds.
20, 10 a. m ...	0	0	0	0	0	0	0	0	
21, 10 a. m ...	2	8	0	0	.....	.....	2	8	
21, 4 p. m...	0	3	0	0	0	0	2	11	
22, 10 a. m ...	0	0	0	0	0	0	2	4	
24, 9 a. m ...	0	0	0	0	0	0	2	4	
26, 9 a. m ...	0	0	0	0	0	0	1	2	
27, 9 a. m ...	0	0	0	0	0	0	1	2	
28, 9 a. m ...	1	3	0	0	0	0	2	5	
30, 9 a. m ...	0	0	0	0	0	0	1	1	

The count of sun spots was made with a ten inch equatorial, with a telescope attachment, and is a continuation of the work done by Professor Todd at the Lawrence Observatory, Mass.

REMARKABLE RAINBOW.

Capt. Samuel Hess, of the s. s. "Philadelphia," reports "that during the morning of September 22d, in N. 29° 20′, W. 70°

50′, with sun's altitude 19° 30′, bearing 94° E., observed a beautiful rainbow, concave, as usual, with apex at 65°, describing an arc of about 50°. In a few moments another bow made its appearance above the original one, of about the same size, but convex, the limbs making a perfect contact. A moment or two later a lesser bow made its appearance, convex, with an altitude of 40°. Barometer 29.92; air temperature 84°; wet bulb 76°; sea 84°; wind s. by e., force 3."

VERIFICATIONS.

INDICATIONS FOR 24 HOURS IN ADVANCE.

The percentages of verifications of the twice daily indications for September, 1888, as determined from comparison of succeeding telegraphic reports, are given in the table below.

The predictions for districts east of the Rocky Mountains for September, 1888, were made by 1st Lieutenant H. H. C. Dunwoody, 4th Artillery, Acting Signal Officer and Assistant, and those for the Pacific Coast districts were made at San Francisco, Cal., by 2d Lieutenant J. E. Maxfield, Signal Corps; the verifications for all districts were determined by Assistant Professor C. F. Marvin.

Percentages of indications verified, September, 1888.

States.		States.	
Maine	83.3	Tennessee	90.6
New Hampshire	80.3	Kentucky	83.7
Vermont	80.3	Ohio	81.1
Massachusetts	80.5	West Virginia	78.7
Rhode Island	78.9	Indiana	83.3
Connecticut	76.1	Illinois	81.5
Eastern New York	81.5	Lower Michigan	82.1
Western New York	84.5	Upper Michigan	73.7
Eastern Pennsylvania	83.6	Wisconsin	81.3
Western Pennsylvania	80.5	Minnesota	82.0
New Jersey	81.1	Iowa	80.2
Delaware	80.1	Kansas	83.9
Maryland	77.6	Nebraska	83.9
District of Columbia	76.5	Missouri	78.2
Virginia	80.5	Colorado	87.1
North Carolina	85.9	Eastern Dakota	87.7
South Carolina	84.1	Southern California	84.4
Georgia	82.4	Northern California	85.3
Eastern Florida	85.1	Oregon	82.1
Western Florida	75.3	Washington Territory	82.6
Alabama	85.7	*By elements:* Weather	83.6
Mississippi	85.3	Temperature	79.4
Louisiana	79.9	Monthly percentage of weather and temperature combined	81.9
Texas	84.4		
Arkansas	85.7		

CAUTIONARY SIGNALS FOR SEPTEMBER.

Statement showing percentage of justifications of wind signals for the month of September, 1888: Number of cautionary signals ordered, forty-nine; justified, twenty-six. Number of storm signals ordered, twelve; justified, eight. Number of signals ordered for easterly winds, thirty-three; justified as to direction, thirty. Number of signals ordered for westerly winds, twenty-seven; justified as to direction, twenty-five. Number of signals ordered late, three. Number of storms without signals, thirty. Percentage of justifications, 55.1. No cold-wave signals were ordered during the month.

LOCAL VERIFICATIONS.

The following extracts from the published reports of the state weather services for September, 1888, show the percentages of verifications of weather and temperature signals:

Indiana.—Seymore: 78 per cent. of the indications were verified.

Michigan.—Weather signals are now displayed in one hundred and thirty-two towns, and upon the baggage-cars of twenty-six trains of eight of the principal railroads of the state.

The indications are issued at 10 p. m., daily, from the Chief Signal Office, Washington, and are for the twenty-four hours from 7 a. m. to 7 a. m.

The percentages of verifications of these indications for September are as follows (the verifications are taken from reports of displaymen furnished this office monthly): temperature, 81.4 per cent; weather, 79.4 per cent.; temperature and weather, 80.4 per cent.

Weather signals are displayed on the baggage-cars of the following railroads: C. & G. T. R'y; D., G. H., & M. R'y; D. D. G. T. R'y; M. C., main line and branches; C. & W. M. R'y; G. R. & I. R'y; P. H. & N. W. R'y; and the P. O. & P. A. R'y.

Minnesota.—The verifications of weather signals were 83 per cent. for weather and 82 per cent. for temperature.

Nebraska.—The percentages of correct weather predictions for the state were for temperature, 90.5; weather, 90.5; mean, 90.5.

Ohio.—The percentages of verification of weather signals received from Washington and distributed to thirty-two stations were seventy-nine for weather and eighty-seven for temperature.

South Carolina.—The percentages of verifications of weather and temperature predictions for the state were for weather, 85.0; temperature, 83.5.

STATE WEATHER SERVICES.

The following extracts are republished from reports for September, 1888, of the directors of the various state weather services:

ALABAMA.

During the first week rains were continuous in most sections of the state; the last half of the month, however, was comparatively dry and favorable for gathering the cotton that has been opening rapidly, particularly in middle and southern Alabama. The rainfall for the month has not been large—the average being only 0.86 of an inch above the normal—but the unusual precipitation in August made the rain in September injurious to most crops.

The temperature was 3°.9 below the normal, but no very decided cool spells occurred. The fall in temperature was gradual, with slight oscillations.

Summary.

Temperature (in degrees Fahr.).—Monthly mean, 72.4; highest monthly mean, 75.7, at Fort Deposit; lowest monthly mean, 65.7, at Gadsden; maximum, 90.5, at Montgomery, 11th; minimum, 35, at Gadsden, 30th; range for state, 55.5; greatest local monthly range, 58, at Valley Head; least local monthly range, 30, at Troy.

Precipitation (in inches).—Average for the state, 4.89; greatest, 9.96, at Talladega; least, 1.68, at Florence.

Wind.—Prevailing direction, northeast.—*P. H. Mell, jr., Signal Corps, Auburn, director.*

ARKANSAS.

Temperature (in degrees Fahr.).—Monthly mean, 69.9; highest monthly mean, 77.5, at Malvern; lowest monthly mean, 63.9, at Conway; maximum, 97.0, at Lead Hill and Texarkana; minimum, 40.0, at Heber, Graham, and Little Rock; range for state, 57.0; greatest local monthly range, 57.0; least local monthly range, 22.0, at Dallas.

Precipitation (in inches).—Average for the state, 1.01; greatest, 2.35, at Devall's Bluff; least, 0.25, at Graham.—*Prof. John C. Branner, Little Rock, director; W. U. Simons, Signal Corps, assistant.*

ILLINOIS.

The temperature was equable, but lower than the average of corresponding months in previous years. There were no very cold, neither were there any hot days. The warmest days were the 8th, 9th, and 10th, and the coldest the 28th and 29th; at no time did the temperature of the air fall below the freezing point, except in the extreme north on the 29th. There were several light frosts, and a killing one on the 29th, but no damage was done to vegetation.

The average temperature for the state was 62°.0, which was 4°.4 below the average of the past ten years. Only once during that period, in 1879, has the monthly mean been lower, when it was 61°.7.

This deficiency of average temperature was evenly distributed over the state; in the northern and central divisions the deficiency was the same—4°.1, while in the southern it was 4°.8. The maximum temperature was about the average, but the minimum was lower than at any time during the past ten years.

The rainfall has, also, been much below the average of previous years. At only two stations—Peoria and Griggsville—was an excess reported. The monthly average was 1.83 inches below that of the past ten years, and was less than that of any September except in 1883, when it was 1.21 inches.—*Col. Charles F. Mills, Springfield, director; James Cassidy, Signal Corps, assistant.*

INDIANA.

Cool temperatures prevailed throughout the month, and the mean was nearly 5° below the normal. September, 1871, was as cool as the past month, and September, 1879, only was slightly cooler. The highest temperatures were noted at most stations on the 8th and 11th, and the lowest on the passage of the highest barometric area on the 29th and 30th; at many places heavy killing hoar-frost and ice formed on the mornings of these dates. Abrupt changes in temperature were of rare occurrence, the most noteworthy occurring on the 30th, with the rapid approach of a low barometric area during the latter part of the day, when the temperature rose rapidly, with a sudden fall in barometer.

The precipitation was small, except in the southeast portion of the state, where heavier rains occurred. During the first half of the month but little rain fell, and the number of rainy days was small. The least rain fell in the

northern portion; slightly greater measurements were reported from the central, and the largest in the southern portions, but the amount was every where deficient.

Small hail fell on the 16th at Blue Lick and near Vevay, and on the 28th at Angola. Light hoar-frosts occurred frequently, and heavy killing hoar-frost and ice formed on the 29th and 30th at many places. Thunder-storms occurred on few dates only, but none were accompanied by violent disturbances.

Temperature (in degrees Fahr.).—Monthly mean, 62.0; highest monthly mean, 67.1, at Mount Vernon; lowest monthly mean, 56.6, at Mauzy; maximum, 91.0, at Lafayette, 11th; minimum, 29.0, at Mauzy, 30th; range for state, 50.0; greatest local monthly range, 58.0, at Lafayette; least local monthly range, 38.0, at Seymour.

Precipitation, including melted snow (in inches).—Average for the state, 1.73; greatest, 4.32, at Mauzy; least, 0.40, at Lafayette.

Wind.—Prevailing direction, northeast.—*Prof. H. A. Houston, Lafayette, director; C. F. R. Wappenhans, Signal Corps, assistant.*

IOWA.

The month was fair, cold, and dry, northwesterly winds and calms prevailing.

The mean temperature was 3°.2 below the normal. Since 1870 September has been as cold or slightly colder, five times, namely, in 1883, 1879, 1875, 1873, and 1871, and in 1860 the month was decidedly colder, being 8°.6 below the normal. The coldest days were the 12th and 13th, the 17th and 18th, averaging 10° below normal, and from the 27th to the 29th the temperature averaged 12° below the normal. The 10th and 11th were the warmest days, averaging 6° above the normal. Accordingly, there were no great fluctuations in the temperature. This fact accounts for the absence of early destructive frosts, notwithstanding the low average temperature of the month. The first frost reported occurred during the first two cold days, on the 12th in the northwest and on the 13th in the northeast. The second two cold days (17th and 18th) did not produce any frost, the sky being generally overcast. The third and most noteworthy cold spell, being clear, was marked by moderate frost to the southeastern part of the state on the 28th, while in the northern parts it was heavier. The growing and ripening seasons were favorable in nearly all parts of the state, and the first general frost being late, no notable damage has been done to corn.

Rain has fallen on fourteen days as a whole, though at any given point it fell on only four days in the west and seven days in the east. The total amount of rainfall was comparatively light, amounting to only 59 per cent. of the normal at the central station. Less than one inch fell on the Missouri slope and in central Iowa as far east as Tama county. Over two inches fell locally in Kossuth county and from Muscatine and Johnson to Jackson counties. In the balance of the state the rainfall ranged between one and two inches. The most extended or general rains fell on the 7th, 10th, 14th, and 21st. The month was free from destructive storms.—*Gustavus Hinrichs, Iowa City, director.*

KANSAS.

The mean temperature was below the average, the deficiency being greatest near the central portion of the eastern division. In Shawnee it was 7°.1 below, in Douglas but 0°.4 below, while in Leavenworth it was 3°.5 below. This deficiency diminished southward, being 2°.4 in Woodson and but 1°.9 in Montgomery counties. The deficiency was somewhat uniform in the southern counties, being 2°.3 in Ford, but it almost entirely disappeared in the central-west, while in Gove and Ellis a slight excess appeared.

The first ten days were characterized by high temperature, but during the last twenty days the changes from quite warm to cold and chilly were frequent and rapid, during which there was a constant lowering of the general temperature, culminating in a sharp frost from the 27th to the 29th.

The average precipitation, 0.72, was decidedly deficient. In Woodson county the rainfall reached the September normal. It was probably not far from the normal in the extreme southwestern counties; in all other sections it was deficient. The deficiency amounted to two and one-half inches in the northeastern counties. In Douglas and Miami it amounted to three inches and upwards, but fell to two and a quarter in Shawnee and to but two in Morris county. It rapidly diminished south to Woodson and Allen counties where it was about normal, while south of these counties it rapidly increased again. From Shawnee to the southwest there was a gradual diminution, the deficiency being but 0.46 in Ford. From Shawnee west and northwest it was more marked, Ellsworth, Trego, and Gove showing a total absence of rain, while in Greeley, Thomas, Decatur, and Jewell but little rain fell. In Cloud, Clay, and Graham the deficiency was materially diminished, while it was nearly obliterated in the contiguous portions of Ellis, Russell, Ford, Kiowa, Clark, and Comanche counties.

Summary.

Temperature (in degrees Fahr.).—Monthly mean, 68; highest monthly mean, 76, at Hays City; lowest monthly mean, 61, at Topeka; maximum, 100, at Bunker Hill and Lebo, 9th; minimum, 32, at Allison, 17th; range for state, 68; greatest local monthly range, 67, at Lebo; least local monthly range, 38, at Victoria; greatest daily range, 46, at Tribune, 13th, and at Gibson 21st; least daily range, 5, on the 14th, at Seneca.

Precipitation (in inches).—Average for the state, 0.72; greatest, 3.91, at Yates Centre; least, 0, at Carneiro, Collyer, Gibson, Ellsworth, Wilson, Grainfield, Grinnell, McAllaster, Monument, and Oakley.

Wind.—Prevailing direction, south.—*Prof. J. T. Lovewell, Topeka, director; T. B. Jennings, Signal Corps, assistant.*

KENTUCKY.

Temperature (in degrees Fahr).—Monthly mean 64.8; highest monthly mean, 66.3, at Ashland and Madisonville; lowest monthly mean, 62.1, at Whitesburg; maximum, 87.4, at Frankfort, 9th; minimum, 30.0, at Whitesburg, 30th; range for state, 57.4; greatest local monthly range, 53.1, at Frankfort; least local monthly range, 42.0, at Madisonville.—*Under direction of the State Polytechnic Society, Louisville; Frank Burke, Signal Corps, assistant in charge.*

LOUISIANA.

The meteorological conditions were favorable to all crops after the disastrous storm of August.

During the first two weeks the rainfall was a trifle heavy in the southwestern portion of the state, but being followed by dry clear weather, with warm sunshiny days and cool nights, the effect on the staples was favorable.

The average temperature was 1°.4 below the normal of the past seventeen years, the deficiency being the same in the northern and southern sections. There were none of the extreme high temperatures reported in former years, the average maxima being slightly above 90° about the 6th and 7th, 11th to 15th, and 21st and 22d. The cool spell occurred during the last three days, when minima ranging from 47° to 60° were reported. The range of temperature was several degrees in excess of a normal daily range for the month in the southern section, and about the normal in the northern section.

There was a deficiency of three inches in the average rainfall as compared with the normal of the past twenty years, being a deficiency of nearly three and and one-half inches in the northern section, and nearly two and one-half inches in the southern section. There were but five of the total number of stations that had rainfall in excess of three inches, and fully 40 per cent. of the stations reported less than one inch. The greatest daily rainfall was 1.88 inches at Port Eads on the 1st.

Nearly 50 per cent. of the prevailing winds were from the northeast, and about 33 per cent. from the north.

Summary.

Temperature (in degrees Fahr.).—Monthly mean, 75.6; highest monthly mean, 79.9, at Lake Providence; lowest monthly mean, 71.0, at Vicksburg; maximum, 98, at Liberty Hill, 20th; minimum, 47, at Amite, 29th; range for state, 51; greatest local monthly range, 50, at Liberty Hill; least local monthly range, 22, at Saint Martinsville; greatest daily range, 40, at Liberty Hill, 19th; least daily range, 5, at Saint Martinsville, 5th, 9th, 16th, 30th; mean daily range for the state, 18.2.

Precipitation (in inches).—Average for the state, 1.71; greatest local monthly rainfall, 5.49, at Port Eads; least, trace, at Trinity.—*R. E. Kerkam, Signal Corps, New Orleans, in charge.*

MICHIGAN.

The mean temperature, 56°.7, was 4°.2 below the normal of thirteen years. The temperature was below the normal in all sections, the greatest deficiency occurring in the Upper Peninsula, and the least in the southern section. The mean daily temperature was above the normal on six days and below on twenty-one, being normal on three days. The highest mean daily temperature, 70°, occurred on the 11th, and the lowest, 42°, on the 28th. The highest mean daily temperature for the past thirteen years, 82°, occurred on the 5th, 1881, and the lowest, 42°, on the 28th, 1888. The highest mean monthly temperature, 68°.4, occurred in 1881, and the lowest, 56°.7, in 1888. The maximum temperature for the month, 92°, occurred at Adrian and Highland Station, 11th, and the lowest, 22°, at Lathrop, 1st. Frosts were general on the 13th, 14th, 25th, 26th, and 29th throughout the state, and in the Upper Peninsula were frequent during the early part of the month.

The average precipitation for the month, 2.50 inches, was 0.72 inch below the normal of thirteen years. The precipitation was below the normal in all sections except the northern, where there was an excess of 0.02 inch. The greatest deficiency (1.49 inches) occurred in the southern section. The largest rainfall was reported in the southeastern part of the southern section, in the northern section, and the northwest part of the central section. General rains fell on the 15th, 16th, 17th, 25th, 26th, 28th, and 30th, and local rains on the 4th, 8th, and 29th. Comparing the precipitation for September with the records of the past twelve years, it is found that the largest monthly rainfall, 5.39 inches, occurred in 1879, and the least, 1.63 inches, in 1882.

Summary.

Temperature (in degrees Fahr.).—Monthly mean, 56.7; highest monthly mean, 61.7, at Columbia; lowest monthly mean, '50.5, at Atlantic and Sault Ste. Marie; maximum, 92.0, at Adrian and Highland Station, on the 11th; minimum, 22.0, at Lathrop, on the 1st; range for state, 70.0; greatest local monthly range, 63.0, at Adrian; least local monthly range, 37.1, at Grand Haven; greatest daily range, 55, at Hillman, on the 3d; least daily range, 3, on the 16th, at Manistee.

Precipitation, including melted snow (in inches).—Average for the state, 2.50; greatest, 6.00, at Hart; least, 0.65, at Madison.—*N. B. Conger, Signal Corps, Lansing, director.*

MINNESOTA.

Temperature (in degrees Fahr.).—The mean temperature, 55.2, was about 2.0 below the September normal for Minnesota. The following are some of the local deficiencies as compared with the averages for many years: Saint Vincent, 0.2; Moorhead, 1.2; Minneapolis, 1.5; Duluth, 1.9; Saint Paul, 3.5, and La Crosse, 5.7. September opened warm and pleasant; on the

2d the highest monthly temperatures were noted at a majority of stations, the maximum for the state being 87.0 at Moorhead. On the 4th the temperature fell below normal and it remained cool five or six days. It was quite warm again on the 10th; on that day the mercury went up to 83.5 at Rolling Green, to 81.0 at Mankato, to 79.0 at Minneapolis, and to 76.0 at Lake Winnibigoshish. After this a cool spell was experienced until the 19th. Ordinary temperature now prevailed for a week. The most notable change was a decided fall, to the freezing point and below, on the 28th and 29th. These two days were the coldest of the month at all stations; 22.0 was the monthly minimum recorded at Medford on the 29th.

Precipitation (in inches).—The precipitation was deficient throughout the state. The amount was only 48 per cent. of the average. At Moorhead it was only 31 per cent. of the local average. At La Crosse, 34 per cent.; at Saint Paul, 49 per cent.; at Duluth, 51 per cent., and at Saint Vincent, 73 per cent. Rainfall of an inch, and over, in one day occurred at only two stations during the month, namely, Lake Winnibigoshish Dam, 1.08, 7th, and 1.00 at Farmington on the 14th and 16th.—*Prof. W. W. Payne, Northfield, director; John Healy, Signal Corps, Saint Paul, assistant.*

MISSISSIPPI.

Summary.

Temperature (in degrees Fahr.).—Monthly mean, 73; highest monthly mean, 76, at Waynesborough and Pearlington; lowest monthly mean, 69, at Corinth and Holly Springs; maximum, 95, at Macon and Hazlehurst on the 6th; minimum, 38, at Corinth, on 30th; range for state, 57; greatest local monthly range, 49, at Corinth; least local monthly range, 31, at Biloxi; greatest daily range, 40, at Meridian on 30th; least daily range, 2, at Pearlington, on the 23d. The monthly mean temperature for the state, 73, was 3 below the mean for this month last year. The highest temperature occurred at the different stations on the 6th, 14th, and 20th, and the lowest temperature on the last three days of the month.

Precipitation (in inches).—Average for the state, 3.14; greatest, 6.71, at Water Valley; least, 0.37, at Artonish Plantation. The average rainfall for the past month, 3.14, is .03 less than the average for September, 1887, and is about the normal.—*Prof. R. B. Fulton, Oxford, director; M. J. Wright, jr., Signal Corps, assistant.*

MISSOURI.

The mean temperature for the month was 64°.7. The highest temperature reported in the state was 97° at Protem, and the lowest, 28°, at Ironton. The average of maximum temperatures was 88°.9, and the average of minimum temperatures, 40°.2, making an average range of 48°.7. The highest temperatures occurred on the 8th, 10th, 11th, and 20th, and the lowest on the 27th, 28th, 29th, and 30th. Frost occurred on the 28th, extending over the entire state, but did no damage to vegetation. Very light frost was also reported on the 13th, 16th, and 30th, in a few localities.

The average precipitation was 1.12 inches, which was considerably below the September normal. The greatest amount reported was 2.59 inches, at Glasgow, and the least, 0.20 inches, at Saint Charles.

In the state, as a whole, rain fell on 22 days, although no more than six days of rain occurred in any one place. The rains were most general on the 8th, 14th, 15th, 16th, 21st, and 22d. Thunder and lightning occurred on all these dates, and on the 7th, 11th, and 12th; the thunder-storms were severest on the 14th and 21st.—*Prof. Francis E. Nipher, Saint Louis, director; G. A. Weber, Signal Corps, assistant.*

NEBRASKA.

The month has been one of the driest on record, with both higher and lower temperatures than for any previous September, and with the mean temperature about the normal.

The mean temperature was 64°.6, the maximum 100° at Culbertson, and the minimum 26° at Ravenna. The maximum has never been higher than 99° nor the minimum lower than 28° in previous Septembers. Light frosts occurred on the 15th, 16th, and 17th, and a killing frost on the 29th.

Only two stations in the state, Sargent and Red Willow, report over an inch of rain. Hay Springs and Palmer report no rain and generally there has been almost none.—*Prof. Goodwin D. Swezey, Crete, director; G. A. Loveland, Signal Corps, assistant.*

NEW ENGLAND METEOROLOGICAL SOCIETY.

Summary.

Temperature (in degrees Fahr.).—Monthly mean, 57.7, (eighty-seven stations); highest monthly mean, 62.7, at Nantucket; lowest monthly mean, 51.4, at Berlin Falls; maximum, 88, at Colchester, 13th; minimum, 18, at Berlin Falls, 7th; range for New England, 70; greatest local monthly range, 60, at Lake Cochituate and Colchester; least local monthly range, 34, at Nantucket; greatest daily range, 46, at Stratford, 7th; least daily range, 1, at Lowell, on the 21st.

Precipitation, including melted snow (in inches).—Average for New England, 8.29 (one hundred and twenty-nine stations); greatest, 13.43, at Northampton; least, 3.77, at Berlin Mills.

Wind.—Prevailing direction, southwest (twelve stations).—*Prof. William H. Niles, Boston, Mass., president; Prof. Winslow Upton, Providence, R. I., secretary; Park Morrill, Signal Corps, assistant.*

NEW JERSEY.

The mean temperature for the month, 63°.1, was 2°.2 below the average determined from past records of fifty-two stations.

The average rainfall for the state, 7.09 inches, is 3.20 inches above the average determined from past records of forty-nine stations. The largest amount reported was 10.65 inches at Oceanic, and the smallest 3.75 inches at Bridgeton. The average number of days upon which rain fell was 12.1.

Summary.

Temperature (in degrees Fahr.).—Monthly mean, 63.1; highest monthly mean, 68.0, at Trenton; lowest monthly mean, 59.3, at Tenafly; maximum, 96.0 at Toms River, 22d; minimum, 30.0, at Tenafly, 30th; range for state, 66.0; greatest local monthly range, 61.0, at Toms River; least local monthly range, 33.0, at Ocean City; greatest daily range, 38.5, at Freehold, 8th; least daily range, .00, at Ocean City, 6th.

Wind.—Prevailing direction, northeast.—*Prof. George H. Cook, New Brunswick, director; E. W. McGann, Signal Corps, assistant.*

NEW YORK.

The highest temperature recorded was 84° on the 18th at New York City, and on the 9th at Palmyra; the lowest, 29°, on the 30th, at Utica; the mean temperature for the state was 54°. Nearly all the stations report the 9th as the hottest day, and the 29th and 30th as the coldest days. The temperature of the month has been generally low, except at Palmyra, where it has been 2° warmer than the normal.

The average precipitation for the state was 4.22 inches, being more than the normal at all places, except at Rochester and Humphrey, where it was less. General rains occurred on the 8th, 16th, and 17th. The heaviest rainfalls were as follows: New York City, Ardenia, and White Plains, over 7 inches, and at Boyd's Corners more than 10 inches. Hail fell at several places on the 29th and 30th. Snow was reported from a few stations on the 30th. Frosts occurred generally on the 6th, 7th, 29th, and 30th.—*E. A. Fuertes, Ithaca, director; I. W. Brewer, Signal Corps, assistant.*

NEVADA.

Temperature (in degrees Fahr.).—The temperature was generally above the normal. The highest reported was 112.1 at El Dorado Canyon on the 14th, and the lowest, 30.0, at Pyramid Lake, on the 26th. Ice formed at Dayton on the night of the 4th. The mean temperature at Carson City was the highest recorded in nine years by nearly five degrees. Most of the stations reported a maximum between 90 and 96. Beowawe reports 98 on the 4th, Hot Springs 100 on the 13th, and Mill City 104 on the 2d. The hot spell was not confined to any portion of the state, and lasted from the 1st until the storm of the 15th, after which the temperature was about the average for the month. It is generally reported that this was the driest and the hottest season ever experienced in Nevada, and the Carson river has never been so low.

Precipitation (in inches).—The rainfall was generally above the average in the western and central part of the state. The periods of rainy weather were from the 14th to 18th, 23d to 24th, and on the 30th; 2.11 inches fell at Pyramid Lake between the evening of the 21st and that of the 26th. The principal storm of the month traveled slowly from the west, and gave a fall of 0.43 at Verdi on the 12th, 0.36 at Carson, 0.46 at Lewers' Ranch, 0.56 at Dayton on the 14th, 0.70 at Eureka on the 17th, and 0.82 at Ely on the 18th.

Wind.—Prevailing direction, northwest.—*Prof. Charles W. Friend, Carson City, director; E. H. Thompson, Signal Corps, assistant.*

NORTH CAROLINA.

Temperature (in degrees Fahr.).—Monthly mean, 68.8; normal, 70.0; departure from the normal, —1.2; highest monthly mean, 74.2, occurred at Southport; lowest monthly mean, 64.3, at Knoxville, Tenn.; highest, 97.0, at Kitty Hawk, 1st; lowest, 29.0, at Lenoir, 30th; range for state, 68.0; mean monthly range, 48.6; greatest monthly range, 58.1, at Kitty Hawk; least monthly range, 33.6, at Hatteras; mean daily range, 14.4; highest mean daily range at Chattanooga, Tenn., and lowest mean daily range, 8.2, at Hatteras.

Precipitation (in inches).—mean, 8.56; normal, 4.76; departure from the normal, 3.80; highest monthly rainfall, 10.88, at Raleigh; lowest monthly rainfall, 4.42, at Chattanooga, Tenn.

Wind.—Prevailing direction, northeast.—*Dr. Herbert B. Battle, Raleigh, director; H. McP. Baldwin, Signal Corps, assistant.*

OHIO.

Temperature (in degrees Fahr.).—The mean temperature of the northern section was 58.9; of the middle section, 60.0, and of the southern section, 61.9. These are 3.4, 4.0, and 3.9, respectively, below the six year means for the sections. The mean temperature for the state, 64, was 3.7 below the average, and was the lowest mean temperature for the month on record in the bureau. The maximum temperature, 91.7, at Wauseon, on the 11th, was the lowest maximum on record for September. The minimum was 26 at the Ohio State University on the 30th. The mean daily range of temperature, 20.5, was the lowest on record for the month. Killing frosts were reported from Ellsworth on the 13th; Wauseon, 14th; North Lewisburg and Ohio State University on the 28th; Dayton, Bangorville, Ripley, and Ohio State University on the 29th and 30th; and Cincinnati, Yellow Springs, Columbus, Logan, and Wooster on the latter date.

Precipitation (in inches).—General rains fell in all sections on the 7th, 8th, 15th, and 16th. Local rains in all sections on the 20th; in the northern section on the 12th, 19th, 26th, 27th, 28th, 29th, and 30th; and in the southern section on the 1st, 3d, 4th, and 28th. The mean rainfall in the northern section was 2.84, and in the middle section 1.43; these are 0.15 and 1.70, respectively, below the averages for the sections. The mean for the southern section, 2.54, was .01 above the average. The mean for the state, 2.27, was

0.61 below the six year average, leaving a deficiency of this amount in the yearly rainfall to October 1st.—*Prof. B. F. Thomas, Columbus, director; Lieut. Charles E. Kilbourne, secretary; C. M. Strong, Signal Corps, assistant.*

PENNSYLVANIA.

Temperature (in degrees Fahr.).—The temperature for September, like that of July and August, was below the normal. At the end of the month the season was about one week late. The mean temperature, 59.0, determined from fifty-two stations, was 2 below the average. The highest temperatures were Emporium, Coatesville, McConnellsburg, Lancaster, New Bloomfield, and Columbus, 84. These occurred on the 9th and 12th. The lowest were Dyberry, 29; Honesdale, Somerset, Bernice, and Columbus, 30. These occurred on the 29th and 30th. The following stations reported the highest mean monthly temperatures: Pottstown, 64.3; Coatesville, 64.6; Carlisle, 63.7; and Catawissa, 63.5. Lowest: Somerset, 53.3; Phillipsburg, 53.5; Bernice, 54.9; Dyberry, 54.5; and Smethport, 55. Frosts were quite general on the 29th and 30th.

Precipitation (in inches).—The average monthly rainfall for the state was 4.84 inches, which is about 1.35 more than the average. It was nearly normal west of the Susquehanna River. The largest monthly totals occurred at Bethlehem, 10.93; Quakertown, 9.36; and Girardville, 8.18. The lowest at Pittsburgh, 1.77; and Wellsboro, 1.75. A number of stations reported light snow on the 29th and 30th.—*Under direction of the Franklin Institute, Philadelphia; T. F. Townsend, Signal Corps, assistant, in charge.*

SOUTH CAROLINA.

The mean temperature as far as reported was 69°.6, being 2°.6 less than the record for September, 1887. In most instances the highest maximum temperature occurred on the 1st, and the minimum on the 30th.

The mean depth of rainfall was 9.86 inches, while the record for September, 1887, shows a mean depth of 1.12 inches. The greatest amount of precipitation occurred at Newberry, where a fall of 17.90 inches was recorded. The rainfall in the early part of the month was general and in many places excessive, causing considerable loss to the farming interests.—*Hon. A. P. Butler, Columbia, director; H. C. Seymour, Signal Corps, assistant.*

TENNESSEE.

The only notable features of the month were the low temperature which prevailed during the last few days, resulting in frosts, and the unusual rainfalls on the 7th, 15th, and 22d. There were but few electrical disturbances, and no very high winds. Altogether the month was rather a pleasant one.

Temperature (in degrees Fahr.).—The mean temperature was 64.2, five less than the September mean of the past years, and the lowest during that period. The highest local mean was 69.4, at Savannah, and the lowest, 62.0, at Fostoria; the highest temperature reported was 90, on the 5th, at Fayetteville, and was the lowest maximum for September during the past six years; the lowest temperature reported was 30, on the 30th, at Fostoria and Lawrenceburg, and was the lowest September minimum during the period above named; the maximum temperature was recorded generally about the 14th and 20th and the minimum, with two or three exceptions, on the 30th; the daily ranges of temperature were generally below the normal.

Precipitation (in inches).—The mean depth of rainfall was 3.38, more than half an inch above the average for six years, and the greatest for that period, except in 1885, when 3.80 fell; of this amount the eastern division received an average of about four and a quarter inches, the middle division about four inches, while the western division received an average of less than an inch and a half. From the 1st to the 7th, inclusive, there were daily rains, mostly light, until the last-named date, on which the heaviest rain of the month occurred, averaging about an inch of rainfall for the entire state. This rain was particularly heavy in the middle division, where the average amounted to 1.67. The rains of the 15th and 22d were also heavy, but with these exceptions very little fell during the last two decades of the month. The greatest rainfall was 6.73 at Riddleton, and the least was 0.40 at McKenzie. The greatest in twenty-four consecutive hours was 3.67, on the 7th, at Riddleton. On this date other heavy rains were reported, as at Austin, 3.00; Florence station, 2.33; Hohenwald, 2.79; Kingston Springs and Ashwood, each 1.50; Nunnelly, 2.01; Waynesborough, 1.47; and Savannah, 1.35. There were fifteen days on which no measurable rainfall was reported.

Wind.—prevailing direction, north and west.—*J. D. Plunket, M. D., Nashville, director; H. C. Bate, Signal Corps, assistant.*

NOTES AND EXTRACTS.

DEPTH OF EVAPORATION IN THE UNITED STATES.

By T. RUSSELL, Assistant Professor, Signal Service.

It has been proposed to find the depth of evaporation that takes place inside the thermometer shelters at the various Signal Service stations. For this purpose the relation has been determined between the evaporation observed at a few stations with Piche evaporometers and the condition of the air as to dryness, deduced from the tri-daily readings of the whirled, wet, and dry-bulb thermometers. The relation between the evaporation as given by a Piche instrument, and what it would be from a water surface, has been determined by comparisons at the Signal Office in Washington of the amounts of evaporation from the Piche with that from a cylindrical tin vessel 6.55 centimetres in diameter and 1.3 centimetres in depth, filled to the brim with water. The amounts of evaporation were obtained by weighings on successive days made to the nearest hundredth of a gramme by means of a fine balance.

The results of the determinations of the evaporation for the whole country are contained in Table III, which gives the computed depth in inches for each month and year. The chart, No. vi, is based on this table. The lines join places having equal annual depth of evaporation.

It is believed that these figures represent, approximately, the evaporation that takes place from the surface of ponds, rivers, reservoirs, and lakes in the vicinity of the Signal Service stations.

This belief is based principally on the results of observations of evaporation and determinations of the humidity of the air from wet and dry-bulb thermometer readings made at Nukuss, from May to October, 1875, under the direction of the Central Physical Observatory at St. Petersburg, and reported upon by Ed. Stelling in Band viii, No. 3, of Wild's "Repertorium für Meteorlogie," 1882.

The observations were made by weighings of the evaporation from the surface of a pond by means of a vessel containing water immersed in the pond. Observations were also made of the evaporation from a water vessel on land, exposed in the sunshine, and from a similar vessel in a thermometer shelter. The wet and dry-bulb thermometers were read every two hours throughout the day during the whole time for five months that the evaporation observations were made. The results of the work were, as given by Stelling, that the humidity results, obtained from wet and dry-bulb readings with suitable constants, represented the evaporation from the surface of the pond within 15 per cent., and that the evaporation from the vessel in the sunshine for the average of five months was about 10 per cent. greater than that from the vessel in shelter. For one month, however—September—the evaporation in the shelter was about 3 per cent. greater than that in sunshine. The air is very dry at Nukuss. The depth of evaporation in June, in the sunshine, the greatest in five months, was 14.9 inches.

Observations of evaporation in Signal Service shelters, from water dishes, would be very difficult. There are many difficulties in the way of observing evaporation from water dishes in the open air. The falling of rain splashes the water from the vessel or adds to it. When the temperature of the air is below freezing it is impossible to get a fair measure of evaporation for a great part of the time, on account of the drifting snow. For the winter season the evaporation calculated by an empirical process from the dryness of the air, such as has been used here for the whole year round, is probably more accurate than any results of direct measurement.

It is acknowledged that the results of direct measurement of evaporation from water dishes, by weighing, would, on the whole, give a more satisfactory determination of the depth of evaporation than the process here resorted to, but the expense of procuring balances, and the great labor entailed on the men at stations by the method, forbid its use.

Even after evaporation is obtained from dishes it is doubtful what it represents. Under the same circumstances of temperature and dryness of air, different shaped vessels will give different results for the depth of evaporation, presumably on account of the varying facility with which the vessel takes the temperature of the air, which depends on its shape, the material of which it is made, and its absolute size. A cylindrical vessel of the same bulk as a rectangular one exposes less surface to the air, and as the vessel gains its heat by contact with the air, it will usually not be at the same temperature as the rectangular one. Evaporation from the surface tends to lower the temperature, and the amount of lowering depends on the relation between the surface and the volume of water. At 8 p. m., as observed at Nukuss, this lowering of the temperature of the water in vessels amounted, on the average in June, to 9°.9 Fahr.

But greater than all other things, in its effects on the depth of evaporation from vessels, is the effect of the depth of the water surface below the rim of the vessel. In the case of a vessel of circular section 2.5 inches in diameter, the evaporation, when brimfull, is about 50 per cent. greater than when the water surface is 0.3 of an inch below the rim.

Even if a satisfactory size and shape of vessel for observation of evaporation could be settled upon, it is very doubtful how nearly evaporation from it would represent the actual evaporation from the surface of a neighboring pond or river, owing to the uncertainty of the effect of the wind. Wind promotes evaporation powerfully, as will be seen further on. But, by means of wind velocities, as measured by anemometers high up in the air, it is hard to estimate the effects of wind on evaporation from a pond or river sheltered by trees or high banks.

For any particular place the most satisfactory way to obtain the depth of evaporation would be by a special investigation for that place.

The Piche evaporometer (see figure) consists of a glass tube 9 inches long and 0.4 of an inch internal diameter. The top end is closed and has an eye for suspending the instrument. The tube is filled with water and on the open end a paper disk 1.2 of an inch in diameter is placed and held in position by a brass fixture sliding easily in a collar along the tube. Water is supplied to

the paper from the tube by capillary action, and evaporates freely from it into the air, the amount depending on the dryness of the air and the velocity of the wind. There is a scale etched on the tube to cubic centimetres and tenths. The difference in the readings of the top of the column of water gives the volume evaporated from the paper in the interval between the readings.

Figure.

Twenty-five of these instruments were procured for the Signal Service, and observations were made daily with eighteen of them at various stations, from the 31st of May to the 30th of September, 1888.

A few of the instruments were calibrated with mercury to test their graduation and were found to be very exact, except in the case of the one sent to Yuma, which was discovered by the observer to be graduated incorrectly below 17 cubic centimetres by one whole cubic centimetre. The paper disks supplied to the stations were all exactly of the same diameter, and the paper all of the same kind, thin, not over one hundredth of an inch thick, and unsized. The brass circular disks holding the paper in place on the tube were all measured and found to have the same diameter within one-tenth of a millimetre. The external diameters of the tubes, where in contact with the paper, varied from 14.0 millimetres to 15.6. The amount of paper surface exposed to the air was taken as twice the area of the paper disk, minus the area of the end of tube, minus the area of brass disk. The amount of surface exposed by the edge of the paper was neglected. Even if this surface was appreciable it is allowed for by the method of standardizing the evaporometers by reference to the water dishes.

The amount of paper surface exposed in the various evaporometers varied from 11.0 square centimetres to 11.4, as follows:

Nos. 1, 2, 3, 6, and 14, at Washington, 11.0, 11.2, 11.2, 11.3, and 11.2, respectively; No. 4 at Boston, 11.2; No. 5 at New York, 11.2; No. 7 at Charlotte, 11.4; No. 8 at Buffalo, 11.2; No. 9 at Cincinnati, 11.2; No. 10 at Memphis, 11.2; No. 11 at New Orleans, 11.3; No. 12 at Chicago, 11.2; No. 13 at Saint Louis, 11.4; No. 15 at Keeler, 11.2; No. 16 at Yuma, 11.2; No. 17 at El Paso, 11.0; No. 18 at Dodge City, 11.2; No. 19 at San Antonio, 11.2; No. 20 at Omaha, 11.2; No. 21 at Denver, 11.2; No. 22 at Saint Vincent, 11.2; No. 23 at Helena, 11.4; No. 24 at Boisé City, 11.3.

The instrument at Charlotte was broken before any observations were obtained. The observations were not well started at Buffalo until the middle of August.

These instruments were mounted in the thermometer shelters at the stations. They were read once a day at 10 p. m. during June, and at 8 p. m. during July, August, and September. The difference in the readings on successive days gave the amount of evaporation for the various days.

The shelters on Signal Service stations are usually at a height of nine feet above the roof of building where situated. The shelter is a cubical box three feet on a side, with the sides of open louvre or lattice work, and a close board bottom and a close double top. It opens by a hinged louvre-work door to the north, which is kept closed except while observations are being made.

To determine the relation between the evaporation from a water surface and that from the Piche, two Piches were compared, in the quiet air of a closed room, with two tin dish-evaporometers, each 6.55 centimetres in diameter and 1.3 in depth. In these experiments the Piches were weighed from day to day, as well as the dishes, and not read by the etched scales, as was the case with those on stations.

The results of the experiments showed that the rate of evaporation from the dishes diminished regularly as its water surface fell below the edge of the vessel. The Piches evaporated 1.33 times that of the dishes, surface for surface, as compared with the dishes while quite full. The coefficient increased to 2.05 as the surface of the water in dish fell.

The coefficient used to reduce the Piche evaporations on stations to an equivalent water surface was 1.33. This was the mean obtained from all the observations with the vessels quite full, as long as the water surfaces did not fall more than 1.5 of a milimetre below the edges of the vessels. All other observations with the surfaces below this limit were rejected.

The coefficient of a similar instrument, as determined by Prof. M. Kunze by comparison with evaporation from a metal dish with a surface of 250 square centimetres (about eight times that of the above), was found to be 1.42, as given by the mean of comparisons from April to October, 1880. The results of the observations are contained in Band xvi of the "Zeitschrift für Meteorolgie," 1881, on page 31.

Dr. Riegler, in Band xiv of the "Zeitschrift" for 1879, page 373, gives the coefficient of Piche as 2.03. His results for the coefficient, which vary all the way from 1.64 to 2.22, are no doubt due to the varying depth of water surface below the edge of evaporating vessel. The vessel used in this case was a 1½ litre cylindrical thin glass vessel immersed in a basin of water exposed in a garden, and weighed at intervals of a few days when there had been no rainfall during the interval.

Concerning the effect of varying kinds of paper used on the Piche, Dr. Riegler says: "Comparative observations showed that papers of perceptibly different thicknesses to the naked eye, and even well marked variations in superficial appearance, gave no perceptible variation in the amount of evaporation provided the paper was unsized." The writers experience also agrees with this. A pad of the thickest sort of blotting paper was cut to exactly the size of the disks in use, and the evaporation from it was found to exceed the other only in the proportion of 107 to 100. The blotting paper being thick, exposed more edge surface than the other disks.

Different Piches, when read together, were found to agree very closely with each other, much more so than two similar tin dishes.

The height of water in the tube, whether full or only containing a small quantity of water, makes no appreciable difference in the rate of evaporation, as was ascertained by experiment.

The following series of results shows what may be expected in the way of agreement among different instruments:

Depth of evaporation, in milimetres, in quiet air.

Date.	Dish A.	Dish B.	Piche No. 2.	Piche No. 3.	Coefficients.	
					No. 2.	No. 3.
1888.						
June 27 to 28	1.03	1.03	1.36	1.38	1.32	1.34
June 28 to 29	1.04	1.01	1.45	1.46	1.41	1.42
June 29 to 30	0.80	0.83	1.37	1.41	1.67	1.72
June 30 to July 1	0.70	0.76	1.32	1.35	1.82	1.85
July 1 to July 2	0.89	0.96	1.66	1.72	1.79	1.86
July 2 to July 3	0.89	.....	1.79	1.86	2.01	2.09

The increasing coefficient, as previously stated, is due to the fall of water surface below edge of vessel.

In Table I are given the depths of evaporation observed with the Piche instruments on stations, reduced by the coefficient 1.33.

TABLE I.—*Depth of evaporation, in inches, observed with Piche instruments, and average wind velocities, in miles per hour.*

Station.	June, 1888.		July, 1888.		August, 1888.		Sept., 1888.	
	Inches.	Miles.	Inches.	Miles.	Inches.	Miles.	Inches.	Miles.
Boston	5.16	10.2	5.87	10.8	5.28	11.3	2.68	9.6
New York	4.49	8.3	5.36	8.4	4.14	9.0	2.88	8.2
Washington	4.64	4.8	4.27	4.5	4.22	3.9	2.52	4.4
Buffalo	.....	.....	.....	.....	.....	.....	3.70	8.1
Cincinnati	6.22	6.1	6.93	5.7	5.36	5.6	4.33	6.4
Memphis	4.33	4.8	5.24	3.9	4.57	5.4	3.86	5.1
New Orleans	3.82	6.8	9.38	6.0	7.96	8.0	3.70	6.3
Chicago	5.59	10.3	5.52	8.7	6.97	10.4	5.79	9.3
Saint Louis	6.18	9.7	5.79	7.9	4.41	8.2	4.61	8.6
Keeler	11.66	7.9	12.76	6.8	12.69	5.4	10.95	6.0
Yuma	13.87	7.3	13.63	7.2	12.88	5.9	10.36	5.4
El Paso	13.91	8.2	9.89	7.2	11.54	8.0	10.00	5.4
Dodge City	7.80	11.6	8.20	12.0	6.22	9.8	6.07	.....
San Antonio	2.76	8.1	5.08	7.1	5.36	7.7	3.66	5.8
Omaha	7.01	7.6	6.62	7.0	5.44	6.8	6.78	7.3
Denver	9.42	8.0	10.91	6.7	8.55	6.2	5.94	.....
Saint Vincent	5.63	7.6	4.33	7.4	4.97	7.5	.....	9.4
Helena	4.88	7.9	8.20	7.1	7.80	6.2	6.86	6.7
Boisé City*	5.83	3.1	9.14	2.2	7.68	1.5	.....	2.6

*Boisé City, October, 7.60 inches.

The amount of evaporation depends principally on the dryness of the air and the velocity of the wind blowing over the evaporating surface. The measure of the dryness of the air is the difference in vapor tension corresponding to the temperature of the air and that corresponding to the temperature of the dew-point.

The wind prevailing inside the shelters is much less than that outside shown by the anemometers. These latter are the ones given in table above.

At Washington City, in the shelter at new office (not the same one as that in which evaporation above given was observed) the wind velocity, by an anemometer set up inside the shelter for eight days, gave a result of 3.48 miles an hour as compared with a velocity of 6.63 miles outside, only 52 per cent. of the velocity outside.

It has been found impossible to make any satisfactory allowance for the wind effect varying with velocity in the observations of evaporation given here, on account of the interference with the wind produced by the sides of the shelter.

Stelling represents the evaporation as the sum of two products, one a constant multiplied by the difference of vapor tension corresponding to the temperature of the water in vessel, and the tension for temperature of dew-point of the air the other factor; the other product a constant multiplied by the wind velocity and the same differences of vapor tensions. While this may be satisfactory for the open air, it does not seem to work well when applied to observations in a shelter. The wind effect has been therefore left out of consideration in this work, except in as far as its effect at all places is taken to be uniform. The figures here given for depth of evaporation must be viewed as applying for the average state of the wind, which, all the year round at stations of the Signal Service does not, on the average, amount to more than 8.5 miles per hour.

A scrutiny of the results of evaporation for single days at the various sta-

tions shows it to depend more largely on the dryness of the air than the wind travel for the day.

Experiments were made which show that the effect of the wind on the evaporation from a vessel exposed in the open air is very great. Two Piche instruments were taken, one suspended in quiet air and the other fixed rigidly on the end of the 28-foot arm of the whirling machine set up in the enclosure of the Pension Office building. The whirling machine was the one used in standardizing anemometers. The instruments, filled with water, were first weighed on a fine balance to the hundredth of a gramme. The whirling arm was then turned so that the Piche on its end moved with a velocity of five miles an hour. The motion was continued for half an hour, and at the end of the time both Piches were again weighed. Then, the Piche that had been suspended in quiet air was put on the arm, and the one that had been on the arm was put in its place. The whirling was then started again at the same velocity, and continued for another half hour. At the end of the time the Piches were again weighed. While this was being done the humidity of the air was determined from time to time by means of whirled wet and dry-bulb thermometers.

Observations were also made in the same way with the Piche moving at velocities of 10, 15, 20, 25, and 30 miles per hour. At a velocity of 5 miles an hour the evaporation from a Piche was 2.2 times that from one in quiet air; at 10 miles, 3.8 times; at 15 miles, 4.9 times; at 20 miles, 5.7 times; at 25 miles, 6.1 times; and at 30 miles, 6.3 times. During the time the observations were made, June 25 and 26, 1888, the average temperature of the air was 83.7, and the relative humidity 50 per cent.

The effect of barometric pressure on evaporation, other things being equal, is to cause the evaporation to be greater as the pressure is lower. The energy required in the expansion of a gas, or the development of a vapor, is equal to the product of the pressure by the volume of vapor produced. The energy remaining the same, then the amount of vapor developed will be inversely proportional to the pressure. The energy required in evaporation comes from the heat of the water, and the water derives its heat, in turn, from the surrounding air by contact of the air-particles with the vessel. The power of the air to communicate heat to the vessel will, of course, be less as its pressure is greater; but it is not imagined that there would be any appreciable diminution of its heat-communicating capacity for pressures only 4 or 5 inches below 30 inches. In the work here, therefore, the evaporation at a place with a pressure below 30 inches is taken to be greater than it would be if the pressure were 30, in the proportion of 30 divided by the pressure at the place.

In Table II are given for the month of June, at the stations where Piche evaporometers were observed, the mean dew-point and the mean air temperature and the mean wet-bulb thermometer readings, as derived from the tridaily observations made at 7 a. m., 3 p. m., and 10 p. m. Table II also contains the mean barometer readings, the vapor tension corresponding to wet-bulb temperature and the dew point, and the Pichè evaporation reduced by the barometer factor, as explained above.

TABLE II.—*Temperature, wet-bulb, dew-point, vapor-tension, barometric pressure, and reduced evaporation, June,* 1888.

Stations.	Mean temperature.	Meen wet-bulb.	Mean vapor tension.	Mean dew-point.	Mean vapor tension.	Mean barometer.	Reduced evaporation.
	°	°	*Inches.*	°	*Inches.*	*Inches.*	*Inches.*
Boston	66.8	59.7	.512	54.7	.427	29.8	5.11
New York	71.4	64.1	.597	60.1	.519	29.7	4.44
Washington	73.0	65.7	.631	61.8	.551	29.8	4.60
Cincinnati	74.2	64.1	.597	57.8	.478	29.3	6.04
Memphis	75.4	68.7	.700	65.3	.623	29.6	4.29
New Orleans	77.3	72.1	.786	69.8	.727	29.9	3.79
Chicago	67.4	60.0	.517	54.9	.430	29.3	5.43
Saint Louis	73.2	66.2	.643	62.2	.559	29.3	6.00
Keeler	73.9	54.3	.421	33.6	.192	26.2	10.14
Yuma	85.6	62.8	.571	46.0	.310	29.6	13.73
El Paso	83.0	60.7	.529	42.5	.271	26.1	12.10
Dodge City	74.5	63.2	.579	56.2	.451	27.3	7.11
San Antonio	78.0	72.2	.789	69.6	.722	29.1	2.68
Omaha	70.0	62.1	.557	56.9	.463	28.7	6.68
Denver	68.4	52.8	.399	36.8	.218	24.7	7.79
Saint Vincent	62.8	57.1	.466	52.7	.397	28.9	5.41
Helena	58.8	50.7	.369	43.4	.261	25.7	4.17
Boisé City	64.2	53.6	.411	44.5	.293	27.0	5.20

The readings of the dry and wet-bulb thermometers at the Signal Service stations are made on a uniform plan. They are whirled inside the thermometer shelters on a whirling apparatus provided for the purpose. The computations of dew-point are also uniform and are made from tables based on an extensive series of comparative observations between a Regnault dew-point apparatus and whirled wet and dry-bulb thermometers made at varying temperatures and humidities at Washington City, Colorado Springs, and the top of Pike's Peak. The vapor tensions for temperature, taken as the basis of the tables used, are Broch's values given in Memoirs of Int. Bur., Vol. I, derived from a re-reduction of Regnault's observed values for the tensions.

All the wet and dry-bulb thermometers at stations have cylindrical bulbs. These instruments have all been supplied to stations within two years past and are all of a high order of excellence. They are stem-graduated to single degrees and the tubes were a number of years old before being graduated, so as to provide to some extent against changes of their freezing points with age. Before issue to stations they were compared at Washington City with standards at temperatures from —28° to 102°. No thermometer is issued which has a correction at any of the points ten degrees apart as great as 0°.3, except in rare instances. In nine-tenths of the cases the corrections are not as large as 0°.1. No corrections are applied on stations unless they are 0°.3 or more. The whirling of the thermometers gives a satisfactory determination for the dew-point even when the temperature of the wet-bulb is below 32°.

The Signal Service thermometer readings and the humidity of the air calculated from them have a high degree of accuracy on account of the excellence of the instruments and their exposure. These circumstances are mentioned because results for humidity of air derived from inaccurate instruments are of little value, as even the smallest errors of instruments enter the determination of vapor tensions from wet and dry-bulb thermometers with great effect.

The amount of evaporation that takes place depends on the dryness of the air, the wind velocity, and the temperature of the evaporating water. In the case of the Piche evaporometer the temperature of the evaporating water is strictly that of a wet-bulb thermometer exposed at the same place.

For the purpose of deriving constants to establish the relation between the amount of evaporation and the dryness of the air, the evaporation will be taken as dependent on the difference of the vapor tensions at dew-point and the temperature of the wet-bulb multiplied by a constant, and on the vapor tension corresponding to the temperature of the wet-bulb multiplied by another constant.

For the various stations where Piches were observed the observation equations given below were formed in this way: The absolute term of each equation is the depth of evaporation at each place, reduced for the barometric pressure as previously explained. Giving these equations equal weight and treating them according to the method of least squares, in the usual manner, multiplying each one through by the coefficient of A, in that equation, and adding, then multiplying each by its coefficient of B, and adding, two normal equations are obtained. Solving these, the values of A and B are derived, which, substituted in the original equations, give the residuals.

Observation equations, residuals	(comp.-obs.).
$+.512\,A + .058\,B - 5.11 = v.$	— .38 .....Boston.
$+.597\,A + .078\,B - 4.44 = v.$	+ .15 .....New York.
$+.631\,A + .080\,B - 4.60 = v.$	+ .15 .....Washington.
$+.597\,A + .119\,B - 6.04 = v.$	+ .35 .....Cincinnati.
$+.700\,A + .077\,B - 4.29 = v.$	+ .46 .....Memphis.
$+.786\,A + .059\,B - 3.79 = v.$	+ .34 .....New Orleans.
$+.517\,A + .087\,B - 5.43 = v.$	— .60 .....Chicago.
$+.643\,A + .084\,B - 6.00 = v.$	—1.05 .....Saint Louis.
$+.421\,A + .229\,B - 10.14 = v.$	+ .73 .....Keeler.
$+.571\,A + .261\,B - 13.73 = v.$	—1.15 .....Yuma.
$+.529\,A + .258\,B - 12.10 = v.$	+ .27 .....El Paso.
$+.579\,A + .128\,B - 7.11 = v.$	— .36 .....Dodge City.
$+.789\,A + .067\,B - 2.68 = v.$	+1.81 .....San Antonio.
$+.557\,A + .094\,B - 6.68 = v.$	—1.46 .....Omaha.
$+.399\,A + .181\,B - 7.79 = v.$	+ .94 .....Denver.
$+.466\,A + .069\,B - 5,41 = v.$	—1.47 .....Saint Vincent.
$+.369\,A + .088\,B - 4.17 = v.$	+ .41 .....Helena.
$+.411\,A + .118\,B - 5.20 = v.$	+ .79 .....Boisé City.

Normal equations:

$$(5.887)\,A + 1.1550\,B - 62.21 = 0 \qquad A = 1.96.$$
$$1.1550\,A + (0.3337)\,B - 16.90 = 0 \qquad B = 43.88.$$

These residuals are quite satisfactory, very much more so than any set that can be derived by allowing for a variable wind effect according to the velocities given in Table I.

Constants have not been computed by means of the Piche evaporation observations made in July, August, and September, as there was a change in the hours of observation of thermometers beginning with July, the thermometers being read at 8 a. m. and 8 p. m., instead of 7 a. m., 3 p. m., and 10 p. m., as formerly. An observation has been made at 3 p. m., and it is to be continued until the end of the present year, but it has not been reduced and carried into the regular forms. To get the mean wet-bulb temperatures and dew-points including this observation, the original records would have to be consulted. The labor of forming means, etc., would have been so great that it was not undertaken.

The evaporation for July to December, 1887, and January to July, 1888. given in Table III, have been computed by the formula—

$$30\left(\frac{A\,p_w + B\,(p_w - p_d)}{b}\right)$$

p_w is the vapor tension corresponding to the monthly mean of the wet-bulb thermometer; p_d is the vapor tension corresponding to the monthly mean dew-point; b is the mean barometer reading; A is a constant equal to 1.96, and B, a constant equal to 43.9. The quantities obtained from the above formula have been multiplied by a factor 1.03 for months of thirty-one days and divided by 1.03 for February. These latter are the quantities given in the table, and they

represent evaporations inside of the shelters when the velocity of the wind outside is 7.1 miles per hour. This is the mean of the velocities at the stations during June where the Piches were observed. This probably corresponds to a velocity inside the shelter of 3.5 miles per hour.

The results derived in this way for Boston can be compared with a very elaborate series of observations of evaporation made at the reservoir of the Boston waterworks by Mr Fitzgerald, and reported upon in the Transactions of the American Society of Civil Engineers, Vol. XV, 1886. These observations were made by measuring the evaporation from a large vessel filled with water and immersed in the reservoir. A raft was floated in the reservoir centre for the purpose of making the observations. Mr. Fitzgerald concludes from his experimental work that there was no difference in the amount of evaporation from vessels in sunshine and shade. The results of the work, as given below, are for a different year from that in which the Signal Service observations were made.

Depth of evaporation at Boston.

At the water-works reservoir.		At the Signal Service station.	
Month.	Inches.	Inches.	
January	0.90	1.62	Computed 1888.
February	1.20	1.81	Do.
March	1.80	2.25	Do.
April	3.10	3.22	Do.
May	4.61	4.46	Do.
June	5.86	5.16	Piche observed, 1888.
July	6.28	5.87	
August	5.49	5.28	
September	4.09	2.68	
October	2.95	2.65	Computed, 1887.
November	1.63	2.21	Do.
December	1.20	1.46	Do.
Year	39.11	38.67	
		34.40	July, 1887, to July, 1888.

The mean annual evaporation at the Croton waterworks reservoir, New York, quoted by Mr. Fitzgerald, is 39.21 inches. The evaporation at New York City Signal Service station, as found here, is 40.6 inches.

An extensive series of evaporation experiments was made at Milwaukee in 1862, 1863, and 1864, from April to October. They are given in detail for each day in the Report of the Chief of Engineers for 1867. The results for the months are given below with the evaporations alongside of them as observed at Chicago by means of the Piche evaporometer in 1888. The Milwaukee observations were made by weighings of a large shallow vessel filled with water and set up inside a thermometer shelter. The incomplete observations, twenty-six days, twenty-seven days, etc., are probably due to loss of the observations caused by rain.

Depth of evaporation in inches.

Month.	Milwaukee.			Mean.	Chicago, 1888. Piche.
	1862.	1863.	1864.		
April	.....	3.04	2.65	2.84	.....
May	4.32 (27)	3.30	8.16 (29)	3.33	.....
June	5.34	5.41	7.35	6.10	5.59
July	6.49	3.18	7.45	6.37	5.52
August	5.04	4.73	4.78	4.85	6.97
September	3.83 (27)	4.00	2.00	3.28	5.79
October	3.06	.....	.....	3.06	.....

As regards the accuracy with which the figures for evaporation given in Table III represent the actual evaporation from ponds, rivers, and lakes, the following may be remarked:

The effect of the high exposure of the shelters is to make the figures too great, the wind action being far greater at the height of the shelters than the level of the ground. The evaporation taking place from a small paper disk, as in the results obtained with the Piche instrument have a tendency to be too small, as the determining temperature of evaporation is that of a wet-bulb thermometer exposed under similar circumstances. In the case of a body of water the determining temperature of evaporation is nearly that of the average temperature of the air. In the sunshine it is far above the air temperature in the case of shallow water. The results are probably within 20 per cent. of the truth.

In conclusion it must be stated that these figures only represent possibilities of evaporation and not actual evaporation over the whole surface of the country. If a set of figures were prepared for the various parts of the country which would represent the opportunities of evaporation which depend on the relative amount of land and water surface and on the wetness or dryness of soil and the amount and character of vegetation, the product of the two sets of figures would be the absolute evaporation.

TABLE III.—*Depth of evaporation, in inches, at Signal Service stations, in thermometer shelters, computed from the means of the tri-daily determinations of dew-point and wet-bulb observations.*

Stations and districts.	Jan., 1888.	Feb., 1888.	Mar., 1888.	April, 1888.	May, 1888.	June, 1888.	July, 1887.	Aug., 1887.	Sept., 1887.	Oct., 1887.	Nov., 1887.	Dec., 1887.	Year.
New England.													
Eastport	0.9	1.4	1.5	2.4	2.5	2.7	2.2	2.9	2.5	2.6	2.2	1.4	25.2
Portland	1.0	1.2	1.8	2.6	1.8	3.2	3.8	3.9	3.4	3.0	2.5	1.4	29.7
Manchester	0.9	1.6	2.2	3.3	3.8	3.9	4.1	3.3	2.5	2.8	2.4	1.4	33.3
Northfield	0.8	1.0	1.5	2.3	2.5	3.4	3.5	2.7	2.3	1.8	1.1	1.0	23.9
Boston	1.2	1.6	2.2	3.4	3.1	4.7	4.4	4.0	3.5	2.7	2.2	1.4	34.4
Nantucket	1.1	1.1	1.2	1.5	1.8	2.1	3.3	3.8	3.4	2.7	1.8	1.8	25.6
Wood's Holl	0.5	0.8	1.8	2.4	1.8	2.7	2.7	2.4	2.7	1.2	0.8	0.5	20.3
Block Island	1.1	1.1	1.2	2.0	1.8	2.6	2.5	3.1	2.8	2.6	1.8	1.4	24.0
New Haven	1.1	1.6	1.8	2.7	2.7	4.1	3.7	3.8	3.1	3.2	2.4	1.6	31.8
New London	1.5	1.3	1.5	2.6	2.8	4.0	3.4	3.9	3.2	3.1	2.4	2.1	31.8
Mid. Atlantic States.													
Albany	0.9	1.2	1.6	3.3	3.9	4.5	5.0	4.7	3.2	3.0	2.1	1.4	34.8
New York City	1.8	1.4	2.0	3.4	3.3	4.6	5.0	5.2	4.3	4.1	3.3	2.2	40.6
Philadelphia	1.6	2.1	2.5	4.4	4.0	5.7	5.7	5.2	4.3	4.0	3.3	2.2	45.0
Atlantic City	1.2	1.6	1.5	2.4	1.8	3.6	3.9	3.3	2.4	1.8	1.2	1.5	25.2
Baltimore	2.0	2.2	2.8	5.1	4.7	5.6	6.0	5.0	4.4	4.3	3.6	2.4	48.1
Washington City	1.8	1.7	2.5	4.2	3.8	6.0	5.4	4.9	4.1	4.2	4.5	2.5	45.6
Lynchburg	2.6	2.7	3.4	5.2	4.5	5.6	4.7	4.3	3.3	3.4	3.2	2.6	45.5
Norfolk	1.8	1.6	2.3	3.5	3.2	4.2	4.6	3.7	3.7	2.9	2.3	1.8	35.6
South Atlantic States.													
Charlotte	2.6	2.6	4.3	6.4	4.5	5.8	4.0	4.0	4.6	4.0	3.6	2.6	49.0
Hatteras	1.8	1.6	1.6	3.5	2.2	3.0	3.3	4.1	3.6	3.2	2.6	1.6	31.3
Raleigh	2.0	1.8	3.6	3.8	4.1	5.4	4.2	3.2	3.0	2.7	2.4	1.8	37.0
Wilmington	2.4	2.2	2.7	3.3	3.3	4.3	4.3	3.1	3.9	3.4	2.8	2.7	38.4
Charleston	2.5	2.5	3.5	3.7	3.9	4.4	4.5	4.2	4.2	4.0	3.2	2.5	43.7
Columbia	2.2	2.3	2.6	4.8	4.3	5.4	4.2	3.8	4.2	3.4	3.6	2.4	43.2
Augusta	3.0	2.0	3.4	5.3	4.8	5.0	4.8	4.5	5.1	4.1	3.6	3.1	49.3
Savannah	3.3	2.8	4.1	4.7	4.3	4.6	4.2	4.7	3.4	3.6	3.5	2.8	46.0
Jacksonville	2.9	2.6	3.8	4.3	4.6	5.3	5.0	4.7	3.8	3.6	3.0	2.1	45.7
Florida Peninsula.													
Titusville	3.5	2.6	3.3	3.8	3.8	4.3	3.8	4.3	4.0	4.1	3.6	3.1	44.2
Cedar Keys	3.3	2.8	4.0	4.6	4.5	5.1	5.0	5.5	4.5	4.1	3.5	2.6	49.5
Key West	3.8	3.7	3.8	4.5	4.4	4.8	5.1	5.1	4.7	4.3	3.8	3.6	51.6
Eastern Gulf States.													
Atlanta	2.7	2.6	4.0	6.2	4.7	5.0	4.5	4.7	5.8	4.6	4.2	2.5	51.5
Pensacola	2.9	2.8	4.1	4.0	4.3	4.6	5.0	5.4	5.2	4.5	3.6	2.4	48.8
Mobile	2.6	2.5	2.8	3.5	3.7	4.0	4.1	4.6	4.6	4.1	3.4	2.2	42.1
Montgomery	3.5	3.3	5.1	6.5	5.3	5.8	4.3	4.5	5.7	4.6	4.3	3.1	56.6
Vicksburg	2.1	2.5	3.6	5.1	5.7	4.8	4.0	5.0	4.7	3.4	4.0	2.2	47.1
New Orleans	2.8	2.8	4.1	3.8	4.2	4.1	4.1	4.3	4.4	4.6	3.7	2.5	45.4
Western Gulf States.													
Shreveport	1.6	2.1	3.0	4.8	4.9	4.2	4.9	5.2	5.0	4.1	3.4	2.4	45.6
Fort Smith	2.2	2.7	3.5	5.3	4.4	4.6	5.6	4.6	4.7	5.9	3.9	2.2	49.6
Little Rock	2.1	2.8	3.5	5.5	4.8	4.1	5.4	5.9	5.8	5.2	4.3	2.3	51.7
Corpus Christi	1.4	1.6	3.3	3.0	3.2	3.9	4.4	4.3	4.3	4.1	3.0	2.3	38.8
Galveston	1.6	2.8	3.2	2.9	4.3	4.2	5.3	5.2	5.2	4.7	4.2	2.4	46.0
Palestine	2.1	3.0	3.3	4.2	4.3	4.5	5.8	4.6	4.8	4.4	4.0	2.2	47.1
San Antonio	2.4	3.3	4.1	3.8	4.0	4.5	6.6	5.8	5.2	5.4	4.2	3.1	52.4
Rio Grande Valley.													
Rio Grande City	2.7	3.5	3.5	3.6	4.5	4.6	6.9	7.0	5.2	4.9	3.6	3.1	53.1
Brownsville	1.8	2.6	2.9	3.0	3.5	3.9	4.0	4.1	3.3	3.0	2.6	2.3	37.0
Ohio Val. & Tennessee.													
Chattanooga	2.0	3.3	3.3	5.3	3.7	4.3	4.3	5.0	5.4	4.0	3.9	1.9	46.4
Knoxville	2.4	2.6	3.4	5.0	3.5	4.2	4.9	5.0	4.9	4.1	3.8	2.1	45.9
Memphis	2.1	2.3	3.1	5.9	5.3	4.8	4.9	5.4	5.5	4.2	4.1	2.4	50.0
Nashville	1.9	2.1	3.2	5.9	5.0	5.1	5.5	6.3	5.9	4.0	3.3	1.9	50.1
Louisville	1.7	2.1	2.8	5.0	5.4	5.8	6.2	7.4	6.4	4.9	3.8	2.1	54.8
Indianapolis	1.3	1.4	2.2	4.6	4.8	5.7	7.7	6.9	5.2	4.1	3.1	1.6	48.6
Cincinnati	1.8	1.8	2.6	4.9	5.2	6.4	6.5	6.6	6.1	4.7	3.3	2.1	52.0
Columbus	1.6	2.0	2.3	4.5	4.8	5.8	6.9	6.4	5.1	4.0	2.6	1.8	47.8
Pittsburg	1.4	1.9	2.2	3.8	4.2	5.4	6.6	5.6	4.9	3.4	2.8	2.3	44.5
Lower lake region.													
Buffalo	0.8	1.1	1.3	2.2	3.3	3.9	4.9	5.2	3.9	2.8	1.9	1.6	32.9
Oswego	0.6	1.0	1.1	2.2	2.8	3.8	3.9	4.0	3.6	2.7	2.2	1.0	28.9
Rochester	0.5	1.1	0.9	2.6	3.8	4.9	4.6	4.1	3.8	2.6	2.2	1.3	32.4
Erie	1.0	1.4	1.4	2.7	3.7	4.6	5.5	4.8	3.1	2.5	1.9	1.2	33.8
Cleveland	1.1	1.4	1.5	2.9	3.3	4.4	5.2	4.9	3.8	3.4	2.4	1.4	35.7
Sandusky	0.8	1.4	1.5	3.2	3.7	4.6	5.4	5.4	3.7	3.4	2.2	1.3	36.6
Toledo	0.9	1.1	1.5	3.5	3.8	4.6	6.0	6.4	3.7	3.4	2.4	1.3	38.6
Detroit	0.8	1.1	1.6	3.0	4.1	4.8	5.9	5.2	3.4	2.8	2.0	1.3	36.0
Upper lake region.													
Alpena	0.7	0.6	0.9	1.6	2.1	3.6	3.8	3.7	2.8	2.2	1.5	0.8	24.3
Grand Haven	0.5	0.7	1.3	2.6	3.1	3.8	4.7	3.8	2.7	2.6	1.7	1.1	28.6
Lansing	0.6	1.2	1.4	2.7	2.8	4.0	4.3	3.9	2.4	1.9	1.4	1.0	27.6
Marquette	0.8	0.8	0.9	1.7	2.4	3.3	3.4	3.3	3.1	2.2	1.3	1.3	24.5
Port Huron	0.6	1.0	1.1	2.6	3.0	3.8	4.6	4.2	3.2	2.5	1.7	1.0	29.3
Chicago	1.0	1.2	1.8	3.2	3.3	4.8	5.4	5.1	4.1	3.2	2.3	1.2	36.8
Milwaukee	0.5	1.0	1.1	2.4	2.6	3.8	4.8	3.7	3.4	2.9	1.9	0.9	29.0
Green Bay	0.5	0.6	0.8	1.7	2.5	4.1	5.6	4.2	3.0	2.4	1.9	0.9	28.2
Duluth	0.5	0.5	0.6	1.5	2.4	2.5	3.9	3.4	3.0	2.5	1.2	1.0	23.0
Extreme northwest.													
Moorhead	0.2	1.4	0.5	2.1	3.6	3.8	3.7	3.3	3.5	2.4	1.3	0.5	26.3
Saint Vincent	0.3	0.3	0.5	1.8	3.8	3.9	3.1	2.6	2.0	0.9	0.3	0.3	22.1
Bismarck	0.4	0.6	0.6	3.0	4.3	4.1	5.6	4.2	4.0	2.6	1.2	0.4	31.0
Fort Buford	1.4	0.7	0.6	3.0	4.7	5.0	6.2	4.9	4.8	3.0	1.7	0.5	35.5
Fort Totten	0.2	0.3	0.4	2.2	4.6	3.8	4.2	3.7	3.7	2.3	1.4	0.4	27.2
Upper Mississippi Val.													
Saint Paul	0.7	0.7	2.2	2.0	2.3	4.1	5.0	3.7	2.8	2.4	1.5	0.7	28.1
La Crosse	0.4	1.2	1.4	3.3	3.5	4.4	5.4	4.7	3.0	3.0	1.8	0.8	32.9
Davenport	0.5	1.0	1.8	3.8	3.4	4.6	6.9	6.2	4.4	3.0	2.3	1.1	39.0
Des Moines	0.6	1.0	1.5	3.7	3.1	4.2	6.6	4.7	4.1	3.3	2.3	0.9	36.0
Dubuque	0.7	1.0	1.4	2.2	2.9	4.3	6.2	4.8	3.3	2.8	1.8	0.9	33.2
Keokuk	0.8	1.1	2.1	4.2	3.7	4.3	7.0	6.8	5.0	3.8	2.9	1.2	42.9
Cairo	1.6	2.1	2.9	5.8	4.4	4.3	5.6	6.5	5.1	4.5	3.8	2.3	48.9
Springfield, Ill	0.8	1.1	2.0	4.6	3.8	4.3	5.4	6.5	4.5	3.5	2.9	1.4	40.8
Saint Louis	1.3	1.6	2.5	5.5	4.7	5.0	7.5	8.0	5.9	4.9	3.9	1.4	52.2
Missouri Valley.													
Lamar	1.1	1.6	2.4	4.4	3.8	4.0	6.0	4.6	3.7	3.6	2.9	1.5	39.6
Springfield, Mo	1.1	1.7	2.4	5.0	4.8	4.0	5.0	3.4	3.4	3.5	3.1	1.4	38.3
Leavenworth	0.9	1.5	2.3	4.6	4.5	5.0	6.3	4.5	4.0	3.9	2.7	1.4	41.0
Topeka	1.1	1.2	2.0	4.0	4.1	4.1	6.3	3.5	3.2	3.0	2.2	1.4	36.1
Omaha	0.8	1.5	1.4	4.4	3.8	5.2	6.2	5.2	4.3	4.3	3.0	1.4	41.7

TABLE III.—*Depth of evaporation, in inches, &c.*—Continued.

Stations and districts.	Jan., 1888.	Feb., 1888.	Mar., 1888.	April, 1888.	May, 1888.	June, 1888.	July, 1887.	Aug., 1887.	Sept., 1887.	Oct., 1887.	Nov., 1887.	Dec., 1887.	Year.
Missouri Valley.													
Crete	0.7	1.1	1.2	3.5	3.3	4.5	5.6	4.7	3.8	3.6	2.4	1.1	35.5
Valentine	1.2	1.6	1.8	5.0	3.2	5.3	6.9	5.0	5.2	3.8	3.3	1.5	43.8
Fort Sully	0.6	0.9	1.3	4.4	4.1	5.2	7.7	4.9	5.7	3.6	2.8	0.7	41.9
Huron	0.3	0.7	0.8	3.7	3.7	4.1	5.7	4.2	4.1	3.1	2.4	0.7	33.0
Yankton	0.4	1.4	1.2	3.3	3.1	4.4	4.6	3.7	2.9	3.0	2.2	0.8	31.0
Northern slope.													
Fort Assiniboine	0.8	1.2	1.2	3.8	4.1	4.2	6.8	5.5	4.8	3.5	2.5	1.1	39.5
Fort Custer	0.6	1.5	1.3	5.4	6.8	4.9	9.6	8.0	6.1	3.4	2.9	1.5	52.0
Fort Maginnis	1.1	1.4	1.1	3.3	3.2	4.6	6.8	4.6	3.8	2.8	2.0	1.1	35.8
Helena	1.1	3.6	2.1	6.1	4.3	5.5	7.2	7.7	6.4	4.3	3.0	2.1	53.4
Poplar River	0.4	0.8	0.8	2.7	4.9	5.7	6.0	4.8	4.4	2.5	1.7	0.7	35.4
Cheyenne	3.3	5.7	4.0	8.2	5.2	10.4	8.0	7.7	8.6	5.8	6.1	3.5	76.5
North Platte	0.8	1.8	1.8	5.4	3.9	6.9	6.0	4.8	3.7	2.8	2.3	1.1	41.3
Middle slope.													
Colorado Springs	3.0	3.3	4.1	6.7	5.6	4.3	6.7	7.2	6.8	4.6	4.2	2.9	59.4
Denver	2.8	3.7	3.5	7.6	5.8	10.5	8.3	8.3	6.1	4.9	4.2	3.1	69.0
Pike's Peak	2.1	1.3	1.5	2.1	1.8	1.9	3.0	4.0	3.0	2.3	2.8	1.0	26.8
Concordia	1.3	2.8	1.8	4.8	4.3	5.7	7.3	5.2	4.3	4.5	3.4	1.8	47.2
Dodge City	1.4	2.4	2.8	4.1	4.6	7.4	8.3	6.6	5.5	5.2	4.2	2.1	54.6
Fort Elliott	1.3	1.9	3.2	5.1	5.4	8.2	7.6	6.2	5.4	4.7	4.2	2.2	55.4
Southern slope.													
Fort Sill	1.6	2.0	2.6	3.8	4.0	4.4	4.8	7.5	5.1	4.2	4.1	2.0	46.1
Abilene	1.8	1.7	3.1	4.2	5.0	5.8	9.5	7.5	6.2	4.5	3.4	1.7	54.4
Fort Davis	5.4	5.7	6.7	8.5	11.0	12.0	11.4	9.0	5.9	5.2	5.7	4.9	99.4
Fort Stanton	3.9	3.9	5.2	7.3	9.5	10.9	9.4	11.6	3.9	4.0	3.6	3.8	76.0
Southern plateau.													
El Paso	4.0	3.9	6.0	8.4	10.7	13.6	9.4	7.7	5.6	5.2	4.6	2.9	82.0
Santa Fé	3.0	3.4	4.2	6.8	8.8	12.9	9.2	9.8	6.6	6.7	5.7	2.7	79.8
Fort Apache	2.6	3.0	3.6	6.8	9.4	9.1	7.1	6.7	5.3	5.2	4.1	2.6	65.5
Fort Grant	5.2	4.8	6.4	9.2	10.2	13.8	12.4	10.5	9.0	7.9	7.2	4.6	101.2
Prescott	1.4	2.8	3.6	5.4	6.2	8.1	6.6	6.5	4.7	4.9	3.6	2.2	56.0
Yuma	4.4	5.2	6.6	9.6	9.6	12.6	11.0	10.2	8.2	8.2	5.5	4.6	95.7
Keeler	3.0	4.6	6.3	8.7	9.3	11.9	12.8	13.9	10.6	8.8	5.9	4.8	100.6
Middle plateau.													
Fort Bidwell	0.8	1.8	1.8	4.6	5.2	4.0	8.8	8.1	5.0	4.6	2.4	1.3	48.9
Winnemucca	0.9	2.8	6.2	9.1	9.3	10.1	11.5	12.0	9.9	6.6	3.7	1.8	83.9
Salt Lake City	1.8	2.7	3.6	7.2	6.9	8.9	9.2	10.7	9.6	6.5	5.0	2.3	74.4
Montrose	1.8	2.7	3.7	6.2	7.0	11.1	10.2	8.3	6.9	5.2	3.4	2.0	68.3
Fort Bridger	1.6	2.5	2.7	4.3	4.3	6.5	7.7	6.8	5.6	4.2	5.2	4.7	56.1
Northern plateau.													
Boisé City	1.6	2.5	3.8	6.1	6.5	6.6	10.0	9.2	7.4	5.2	3.2	1.8	63.9
Spokane Falls	0.7	1.7	2.7	4.4	5.4	4.4	7.7	6.4	3.8	2.5	1.7	1.4	42.8
Walla Walla	1.1	2.9	3.6	6.2	7.7	5.7	9.9	7.9	5.1	3.4	1.8	2.4	57.7
North Pacific coast.													
Fort Canby	1.2	1.1	1.8	2.1	2.8	2.3	1.8	2.9	1.8	1.8	1.5	0.9	21.1
Olympia	1.3	1.2	1.8	2.5	4.1	3.3	3.2	3.1	2.4	1.5	1.3	1.1	26.8
Port Angeles	1.0	0.9	1.8	1.8	2.5	2.1	2.1	1.8	1.5	1.2	1.3	1.1	19.1
Tatoosh Island	1.2	1.1	1.8	1.4	1.8	1.8	1.4	1.4	1.6	1.8	1.4	1.8	18.1
Astoria	1.1	1.0	1.6	2.1	3.0	2.7	3.0	2.9	2.6	2.3	1.8	1.2	25.3
Portland	0.9	1.1	2.4	3.4	5.0	3.2	5.4	4.2	3.4	2.7	1.8	1.2	34.7
Roseburg	1.2	1.6	2.7	3.9	4.7	3.5	5.4	4.7	5.0	3.2	1.7	1.6	39.2
Middle Pacific coast.													
Red Bluff	3.0	4.6	5.4	6.1	7.0	6.9	11.0	10.7	10.1	10.5	5.9	3.6	84.8
Sacramento	1.8	3.1	3.7	4.3	4.2	5.6	5.9	5.6	6.5	7.3	3.9	2.4	54.3
San Francisco	2.7	2.7	3.3	3.1	2.8	3.1	2.4	2.5	3.3	5.0	2.8	3.0	36.7
South Pacific coast.													
Fresno	1.8	2.8	3.0	5.6	6.0	7.0	9.1	10.2	7.6	6.7	3.8	2.2	65.8
Los Angeles	2.3	2.0	2.8	3.4	3.0	3.8	3.2	3.5	3.1	4.1	3.0	3.0	37.2
San Diego	2.9	2.7	2.5	2.7	3.3	2.8	3.2	3.3	2.9	4.3	3.2	3.7	37.5

Meteorological record of voluntary observers and Army post surgeons, September, 1888.

The maximum and minimum temperatures at stations marked thus (*) are from readings of other than standard instruments.

Stations.	Temperature. (Fahrenheit.) Max.	Min.	Mean.	Precip'n.
Alabama.	°	°	°	*Ins.*
Auburn	87	46	72.1	4.90
Bermuda	90	52	74.0	5.09
Carrollton	84	46	69.7	3.27
Citronelle	93	49	76.0	4.50
Eufaula	89	43	70.0	3.63
Florence	85	48	67.3	1.68
Fort Deposit	90	49	75.7	8.03
Gadsden	87	35	68.1	7.08
Greensborough	88	30	71.6	7.93
Livingston	88	48	71.3	7.20
Marion	88	44	73.2	3.84
Mt. Vernon B'ks	93	50	75.0	2.64
Mount Willing	85	30	73.5	6.32
New Market*	83	40	66.9	6.91
Pine Apple	90	50	73.9	.....
Talladega	87	30	72.1	9.96
Tuscaloosa	85	44	74.2	2.76
Tuscumbia	86	41	68.2	2.42
Troy	84	54	74.4	6.39
Union Springs	90	44	72.1	6.98
Uniontown	89	49	73.7	4.22
Valley Head	88	30	65.7	2.75
Arizona.				
Antelope Valley	.....	.....	.....	0.10
Cedar Springs	.....	.....	.....	0.62
Flagstaff	.....	.....	.....	1.00
Globe	97	.....	.....	0.65
Holbrook	92	48	71.0	0.87
Fort Huachuca	85	60	.....	0.96
Arizona—Cont'd.				
Fort McDowell	104	68	.....	0.30
Fort Mojave	114	59	88.2	0.00
Teviston	.....	.....	.....	0.05
Tombstone	.....	.....	.....	0.50
Tucson	103	65	.....	0.10
Whipple Barracks	83	52	.....	0.62
Winslow	98	44	.....	0.71
Arkansas.				
Alexander	88	49	69.3	1.55
Conway	92	49	63.9	1.72
Dallas	85	63	70.7	0.50
Dayton	90	65	71.1	1.60
Devall's Bluff	89	42	68.5	2.35
El Dorado	86	45	69.2	0.30
Forrest City	91	56	73.6	0.50
Graham	92	40	.....	0.25
Heber	89	40	67.8	2.10
Helena	88	47	69.7	1.00
Hot Springs	.....	45	.....	0.70
Lead Hill	97	40	68.9	0.48
Lonoke	91	50	73.4	1.62
Malvern	90	60	77.5	0.94
Monticello	94	45	73.1	0.45
Osceola	88	43	68.1	0.94
Ozone	86	49	64.0	1.75
Portia	95	43	68.6	1.21
Prescott	86	50	73.1	0.10
Russellville	90	41	70.2	0.70
Stuttgart	87	43	68.5	1.20

Meteorological record of voluntary observers, &c.—Continued.

Stations.	Temperature. (Fahrenheit.) Max.	Min.	Mean	Precip'n.
Arkansas—Cont'd.	°	°	°	*Ins.*
Texarkana	97	47	74.1	0.59
Washington	88	49	71.1	0.64
British Columbia.				
New Westminster	.....	.....	61.1	1.78
California.				
Alcatras Island	64	54	.....	0.75
Anderson	104	70	84.0	0.00
Angel Island	79	.....	.....	1.15
Banning	105	58	.....	0.10
Barstow	106	55	.....	0.38
Benicia Barracks	84	58	.....	0.90
Fort Bidwell	84	52	.....	0.34
Fort Gaston	90	43	.....	.....
Fort Mason	.....	.....	60.0	0.86
Lewis Creek*	110	62	86.0	0.07
Needles	111	63	82.0	0.06
Oakland	74	54	62.0	0.92
Oroville	102	57	80.0	0.63
Presidio of San F.	67	51	.....	0.41
Sacramento	98	48	68.6	0.51
Salinas	74	47	59.6	0.56
Santa Barbara	88	53	67.9	0.03
Santa Maria	83	47	65.0	T.
Willow	109	52	79.2	0.38
Colorado.				
Delta	97	35	62.5	T.
Fort Collins	89	41	60.2	0.29
Fort Lewis	83	40	60.6	0.42
Georgetown	74	36	55.1	0.07
Connecticut.				
Birmingham	.....	.....	.....	7.67
Canton	80	28	.....	9.92
Colchester	88	28	59.5	.....
Clark's Falls	.....	.....	.....	9.62
Hartford a	78	28	57.5	7.08
Hartford b	.....	.....	.....	7.82
Lake Konomoc	.....	.....	.....	8.34
Mansfield	78	27	57.1	8.45
Middletown	77	31	58.5	7.81
New Britain	.....	.....	.....	7.95
New Hartford*	79	28	56.2	9.58
N. Woodstock	.....	.....	.....	9.24
Pomfret	.....	.....	.....	8.95
Shelton	77	32	59.0	7.35
Southington	81	31	59.0	7.80
Thompson	78	30	57.6	.....
Uncasville	.....	.....	.....	9.45
Voluntown	78	31	58.6	8.25
Vernon Centre	.....	.....	.....	9.65
Waterbury	80	26	59.2	7.57
Wadlingford	.....	.....	.....	7.21
W. Simsbury	.....	.....	.....	8.88
Dakota.				
Brookings	93	23	56.8	0.56
Davenport	88	25	.....	0.52
Fort A. Lincoln	94	27	58.4	0.20
Fort Meade	90	35	58.9	.....
Fort Pembina	84	24	53.8	1.10
Fort Randall	.....	.....	.....	0.66
Fort Sisseton	88	32	58.3	0.08
Fort Sully	95	31	65.2	0.10
Fort Totten	87	31	57.1	0.49
Fort Yates	95	27	58.0	0.20
Gallatin*	.....	.....	56.2	.....
Garden City	84	29	56.1	0.60
Goddard	95	31	.....	.....
Grand Forks	81	22	57.2	1.32
Kimball*	90	30	52.5	0.15
New England City	93	17	54.1	T.
Webster	89	27	58.0	0.48
Woonsocket	90	27	58.7	0.17
Delaware.				
Newark	76	42	57.1	0.26
District of Columbia.				
Distribut'g res'v'r*	81	44	65.4	9.74
Receiving res'v'r*	80	41	65.4	8.93
Washington aque.*	86	43	68.2	.....
Florida.				
Altamonte Springs	93	58	76.5	7.47
Alva*	93	66	76.1	11.82
Archer	100	52	79.1	10.82
Duke	91	51	76.0	11.86
Fort Meade*	92	68	80.0	8.07
Homeland*	92	64	79.8	9.90
Manatee	92	65	81.7	10.02
Merritt's Island	90	64	78.4	8.01
St. Francis Bar'cks.	83	61	77.0	4.80
Tallahassee	91	49	74.7	7.90
Georgia.				
Andersonville	100	39	73.2	7.70
Duck	84	30	66.7	6.40
Forsyth*	.....	.....	72.8	8.69
Hephsibah	76	49	61.5	.....
Marietta	84	36	66.0	9.46
Milledgeville	86	43	72.5	11.00
Quitman	.....	.....	.....	6.50
Thomasville	93	48	70.5	8.69
Idaho.				
Boisé Barracks	100	41	68.4	0.07
Lewiston	99	48	.....	0.15
Illinois.				
Aledo	86	32	60.0	1.84
Aurora*	88	32	59.0	1.89
Atwood	90	32	65.3	1.36
Beason	88	32	59.3	1.60

Stations.	Temperature. (Fahrenheit.) Max.	Min.	Mean	Precip'n.
Illinois—Cont'd.	°	°	°	*Ins.*
Belvidere	83	32	58.3	0.68
Brush Hill	92	39	62.9	2.27
Cedarville	81	32	57.5	0.81
Charleston*	90	36	68.6	1.42
Collinsville	87	38	64.0	2.26
Dwight	91	32	61.9	0.40
Flora	86	32	62.0	1.26
Greenville	92	32	63.3	1.47
Griggsville	86	37	65.1	4.00
Hennepin	91	30	60.3	1.21
Irishtown	91	39	63.5	0.87
Jacksonville	87	37	61.6	2.05
Joliet	82	36	58.0	0.90
Lacon	88	32	62.5	1.04
Lake Forest	86	30	58.0	1.50
Lazark	83	34	62.0	1.24
Martinsville	78	34	61.9	1.36
Mascoutah	89	44	67.7	1.23
Mattoon	94	32	60.0	1.48
Mount Morris	85	32	59.1	2.70
Olney	88	41	65.0	0.91
Oquawka	92	38	68.2	1.00
Oswego	84	29	56.3	1.22
Ottawa	80	34	56.9	0.60
Palestine	86	32	61.4	0.76
Pana	86	40	63.2	1.66
Paris	88	36	60.1	2.44
Pekin*	90	32	62.7	2.17
Peoria	91	35	61.9	4.79
Philo	88	34	62.0	1.18
Polo	88	35	62.0	1.18
Pontiac	92	32	61.4	0.47
Riley	80	31	56.4	1.00
Rockford	81	28	58.5	1.05
Sandwich*	85	40	61.6	1.26
South Evanston	86	32	.....	1.54
Sumner	90	32	66.8	1.40
Sycamore	81	27	54.9	1.09
Vandalia	85	36	63.0	1.25
Watseka	90	31	59.2	0.50
White Hall	86	40	65.3	2.10
Windsor	88	34	63.2	1.28
Winchester	94	28	66.0	2.45
Winnebago	86	32	57.4	1.10
Woodstock	80	26	55.2	0.82
Indiana.				
Angola	83	39	61.0	3.93
Blue Lick	82	40	64.0	3.09
Butlerville*	86	34	64.7	2.69
Columbia City	86	35	62.1	1.28
Columbus	86	35	62.2	2.18
Connersville	82	34	61.4	1.35
Delphi	88	37	60.5	0.69
Degonia Springs	83	37	66.5	1.35
Farmland	86	36	61.5	1.46
Franklin	86	35	62.7	2.20
Jeffersonville	84	39	64.7	3.32
Lafayette	91	33	61.7	0.40
Marengo	88	38	66.4	4.31
Marion	86	37	59.4	0.11
Mauzy	83	29	56.5	4.32
Mount Vernon	86	40	67.1	1.08
Princeton	90	36	64.1	0.90
Richmond	82	36	60.4	1.47
Rockville	85	31	63.0	1.60
Sunman*	86	30	61.1	1.23
Seymour	82	44	65.0	1.20
Scallsville	89	41	67.1	1.24
Vevay	85	36	64.3	4.22
Worthington	83	34	61.7	1.31
Indian Territory.				
Coddo Creek	98	48	.....	.....
Fort Gibson	95	40	70.4	0.15
Fort Reno	94	40	71.1	1.60
Fort Sherman	79	45	.....	T.
Fort Supply	94	37	.....	1.20
Iowa.				
Amana	84	37	58.2	1.38
Ames	83	38	59.6	0.85
Bancroft*	88	30	58.2	1.22
Cedar Rapids a	84	29	58.6	1.07
Clarinda	91	41	63.0	0.60
Clinton	86	29	58.0	0.97
Cresco	81	31	55.8	0.82
Cromwell*	.....	.....	.....	0.27
Des Moines	90	32	60.8	.....
Dysart	87	29	.....	0.95
Elkader	80	34	58.7	2.35
Fort Madison	87	34	.....	1.39
Glenwood a	96	36	65.6	0.43
Glenwood b	92	30	63.2	.....
Grinnell	84	38	59.5	1.59
Hampton	88	28	55.5	2.28
Independence*	76	34	57.4	1.13
Iowa City	82	39	62.1	3.01
Logan	.....	.....	64.4	0.83
Maquoketa*	82	.....	.....	2.55
Manson*	84	38	63.0	1.84
Monticello*	82	26	58.4	1.85
Mount Pleasant	79	40	61.2	1.47
Mount Vernon*	84	35	61.8	2.90
Muscatine	87	32	59.2	2.00
Osage	.....	.....	.....	1.32
Osceola	75	32	56.6	0.00
Oskaloosa a	86	37	.....	1.25

Meteorological record of voluntary observers, &c.—Continued.

Stations.	Temperature. (Fahrenheit.) Max.	Min.	Mean	Precip'n.
Iowa—Continued.	°	°	°	*Ins.*
Oscaloosa *b*	88	34	62.3	1.19
Sac City	87	37	56.9	1.36
Smithland	.....	.....	.....	0.35
Vinton	.....	.....	57.0	0.57
Washington	.....	.....	.....	1.27
Kansas.				
Allison	96	32	.....	0.36
Brookville	99	36	.....	0.60
Burn Oak	.....	.....	.....	0.06
Cawker City	95	40	66.0	0.40
Collyer	98	46	66.0	0.00
Cunningham	96	38	66.0	1.47
Dorrance	98	44	71.0	0.25
Dwight	.....	.....	.....	0.90
Elco	.....	.....	.....	0.70
Elk Falls	95	40	.....	0.83
Ellsworth	94	47	71.0	0.00
Englewood	.....	.....	69.6	0.24
Eureka	.....	.....	.....	0.35
Fort Hays	96	33	66.0	0.84
Fort Riley	94	37	67.5	2.10
Gibson	97	34	67.0	0.00
Globe	90	45	65.7	0.93
Gorham	97	40	.....	2.50
Gove City	.....	.....	.....	0.00
Grainfield	96	50	72.0	0.00
Grinnell	98	46	.....	0.00
Grenola	96	41	65.0	1.10
Halstead	91	38	64.0	1.13
Hays City	91	46	76.0	0.30
Havensville	.....	.....	.....	1.25
Hill City	.....	.....	.....	1.50
Hugoton	.....	.....	.....	1.30
Independence	97	43	68.3	2.00
Lawrence	91	39	66.0	0.23
Leavenworth	91	39	66.7	0.40
Lebo	100	33	66.7	0.89
Manhattan *a*	97	38	66.0	2.95
Montero	95	40	69.0	0.10
Morse *	90	36	63.0	1.00
Pence	94	37	64.0	0.40
Rome	95	44	68.0	1.89
Salina *	96	47	77.0	0.50
Santa Fé	93	44	68.0	.....
Sedan	95	46	69.3	1.26
Seneca	96	36	65.0	0.80
Tribune	98	35	65.1	0.01
Topeka	93	33	63.0	0.57
Toronto	91	36	65.4	3.91
Wakefield *	96	39	67.4	1.74
Yates Centre	91	36	65.4	3.91
Kentucky.				
Ashland	84	38	66.3	3.07
Bowling Green	90	39	.....	3.31
Carlisle	87	42	64.5	3.09
Frankfort	87	34	63.8	2.15
Madisonville	89	40	66.3	1.63
Millersburg	81	38	.....	7.35
Owensborough	84	40	66.0	1.00
Whitesburg	81	30	62.1	.....
Louisiana.				
Liberty Hill	98	48	73.5	0.86
Luling	90	55	.....	1.76
Maine.				
Bar Harbor	80	33	.....	6.36
Belfast	69	38	54.4	.....
Calais	77	29	55.4	5.64
Cornish	74	31	53.8	7.97
Fairfield	74	26	55.3	6.75
Fort Preble	.....	.....	.....	5.20
Gardiner	76	34	55.3	7.12
Kent's Hill	73	31	54.4	8.57
Lewiston	75	34	55.4	7.73
Mayfield	74	28	50.9	5.90
Orono	75	30	54.8	6.97
Petit Manan	78	42	53.0	.....
Maryland.				
Barren Creek Sp'gs	83	43	65.6	5.52
Cumberland	80	36	59.3	3.95
Fallston	80	36	62.4	7.09
Fort McHenry	81	46	63.3	5.04
Galena	.....	.....	65.0	.....
Gambrills	80	39	60.0	3.40
Great Falls *	83	36	64.0	7.27
Jewell	77	43	77.4	1.65
McDonogh	77	39	62.5	7.80
Mt. St. Mary's Col.	79	38	57.8	3.85
Summit Hall	70	37	.....	6.75
Woodstock	83	55	69.0	6.87
Massachusetts.				
Amherst *a*	76	25	54.7	10.70
Amherst *b*	77	30	56.1	11.62
Beverly Farm	73	31	55.2	8.07
Blue Hill Observ'y.	70	34	50.0	9.58
Cambridge *a*	75	32	53.4	7.84
Cambridge *b*	73	32	53.4	8.26
Chestnut Hill	78	30	53.6	9.45
Chicopee	.....	.....	.....	10.94
Clinton	.....	.....	.....	7.35
Cottuit	80	34	59.7	9.80
Deerfield *a*	79	26	53.9	8.83
Deerfield *b*	80	32	59.2	.....
Dudley	76	30	56.8	7.57
Fall River	.....	.....	.....	6.93
Fiskdale	.....	.....	.....	6.81

Stations.	Temperature. (Fahrenheit.) Max.	Min.	Mean	Precip'n.
Massachusetts—Con.	°	°	°	*Ins.*
Fitchburg *a*	79	35	56.1	10.57
Fitchburg *b*	79	35	56.9	10.86
Framingham	78	27	52.4	8.99
Gilbertville	79	24	56.4	9.84
Groton *a*	78	29	58.2	10.43
Lake Cochituate	82	22	55.0	8.69
Lawrence	78	31	56.4	7.74
Leominster	.....	.....	.....	10.57
Long Plain	78	32	.....	10.35
Lowell *b*	78	29	59.2	7.97
Ludlow	76	25	57.0	9.34
Lynn	76	34	56.8	8.85
Mansfield	80	36	58.4	9.80
Middleborough	79	26	58.2	9.44
Medford	.....	.....	.....	7.79
Milton	77	33	55.9	8.70
Monson	76	24	57.3	7.44
Mt. Nanotuck	.....	.....	.....	10.18
Mystic Lake	.....	.....	.....	8.85
Nahant	77	35	57.5	6.48
New Bedford *a*	77	34	58.7	9.52
New Bedford *b*	79	32	59.4	11.56
Newburyport *a*	80	31	57.0	8.47
Northampton	78	32	60.4	13.43
Plymouth	82	40	60.1	6.67
Princeton	74	30	56.1	6.38
Provincetown	76	36	59.4	6.96
Rowe	80	28	54.0	6.25
Salem	.....	.....	.....	7.97
Somerset	86	32	62.0	7.27
Southingham	.....	24	.....	9.21
Sprinfield	77	28	62.0	9.00
Swampscott	77	33	.....	7.95
Taunton *a*	84	30	58.4	8.79
Tannton *b*	79	29	58.2	9.11
Taunton *c*	79	25	58.6	9.14
Waltham	.....	.....	.....	8.50
Wellesley	79	30	59.0	9.15
Westborough *	82	28	60.1	8.18
Winchester	.....	.....	.....	8.29
Worcester	76	31	56.8	7.56
Michigan.				
Adrian	92	29	58.7	1.19
Albion	90	36	60.5	2.21
Alma	87	30	55.3	2.22
Atlantic	78	32	50.5	2.27
Bear Lake	79	30	55.8	5.54
Benton Harbor	81	43	56.3	1.84
Berlin	88	31	58.5	1.62
Big Rapids	81	28	56.0	2.86
Birmingham	88	27	58.1	1.19
Bronson	90	30	57.3	1.59
Buchanan	95	38	55.6	1.01
Calumet	72	36	51.7	1.84
Cassopolis	86	37	58.9	2.41
Charlevoix	72	40	55.4	5.71
Chase	80	25	53.9	2.91
Chelsea	87	30	57.9	.....
Coldwater	87	37	59.2	2.92
Colon	86	32	58.2	1.82
Columbia	82	40	61.7	1.13
Concord	88	35	58.5	2.73
Corunna	87	32	57.4	1.55
Deer Lake	81	31	55.2	3.31
Eden	88	36	59.4	2.92
East Saginaw	.....	.....	52.2	2.38
Fletcher	86	30	55.7	2.80
Fort Brady	73	30	52.8	3.56
Gaylord	74	28	51.7	3.15
Grand Rapids	82	35	60.2	2.07
Hanover	84	36	58.5	2.19
Harriaville	90	28	56.0	3.04
Hart	85	30	57.7	6.00
Hastings	83	35	57.9	2.78
Highland Station	92	36	60.0	0.66
Hillman	88	27	56.3	1.91
Hudson	86	15	.....	0.99
Ionia	85	23	59.2	1.80
Jeddo	88	34	60.9	1.12
Kalamazoo *a*	83	39	61.0	2.40
Kalamazoo *b*	88	37	59.0	2.42
Lansing	86	33	57.8	2.06
Lathrop	84	22	53.2	5.08
Madison	88	36	58.3	0.65
Marshall	88	36	60.8	2.62
May	82	30	56.4	1.04
Mio	83	34	55.3	2.03
Mottville *	89	33	60.3	2.28
Mount Pleasant	83	34	58.2	1.27
Omer	85	34	58.2	1.14
Ovid	87	33	57.3	2.22
Petersburg	89	34	59.3	1.69
Pontiac	81	37	59.8	1.16
Pulaski	87	36	59.2	1.92
Saint Johns	89	33	58.6	1.88
Sand Beach	85	31	59.1	0.76
Thornville *	90	34	58.2	1.52
Traverse City *a*	85	32	56.0	6.14
Traverse City *b*	81	33	56.2	5.76
West Branch	81	30	54.6	2.35
Williamstown	90	38	60.8	3.07
Ypsilanti	88	30	59.2	0.91
Minnesota.				
Argyle	80	25	52.2	1.35
Delano	81	24	57.3	1.82

Meteorological record of voluntary observers, &c.—Continued.

Stations.	Temperature. (Fahrenheit.) Max.	Min.	Mean.	Precip'n.
Minnesota—Cont'd.	°	°	°	*Ins.*
Farmington	82	34	57.0	2.80
Fort Snelling	85	29	62.7	1.70
Grand Meadow	80	38	52.6	1.36
L. Winnibigoshish	76	36	55.3	2.01
Leech Lake Dam	78	30	51.1	1.48
Le Sueur	81	24	.....	3.00
Mankato	81	31	58.1	1.37
Medford	84	22	54.7	1.24
Minneapolis	79	35	57.0	1.58
Morris	84	30	58.6	1.82
Northfield	80	29	57.4	0.84
Pine River Dam	82	32	56.7	1.86
Pokegama Falls	78	23	48.6	1.56
Red Wing	80	28	57.2	1.32
Rochester	80	24	.....	1.20
Rolling Green	84	32	58.8	1.50
Saint Cloud	80	32	.....	.....
Mississippi.				
Aberdeen	98	44	71.0	3.83
Artonish Plantation	92	52	75.0	0.37
Batesville	85	48	71.0	6.09
Biloxi	87	56	74.7	4.64
Brook Haven	94	48	75.0	3.65
Canton	75	51	.....	3.13
Columbus	93	45	75.0	3.74
Corinth	87	38	69.0	1.46
Edwards	90	49	74.0	2.98
Haselhurst	95	49	75.0	0.27
Hernando	85	47	70.0	3.10
Holly Springs	85	44	69.0	4.10
Logtown	90	55	76.0	.....
Macon	95	44	75.0	1.91
Meridian	90	44	75.0	1.10
Natches	90	48	73.0	3.77
Okalona	90	46	72.0	4.05
Palo Alto	87	48	70.6	6.25
Pearlington	88	56	76.0	.....
Port Gibson	92	44	75.0	1.02
Water Valley	.....	.....	.....	6.71
Waynesborough	90	48	76.0	3.71
Yasoo City	.....	.....	.....	2.72
Missouri.				
Arlington	.....	.....	.....	0.88
Conception	89	44	63.3	0.45
Fayette	80	61	70.7	1.76
Fox Creek	84	42	63.3	1.19
Glasgow	92	38	64.8	2.59
Harrisonville	89	39	63.2	0.00
Hermann	.....	.....	.....	0.94
Ironton	80	28	56.4	1.45
Kansas City	94	36	66.8	0.24
Kirksville	88	40	62.0	2.32
Lamar	80	52	71.0	.....
Mexico	.....	43	.....	1.91
Miami	94	38	64.8	0.71
Oregon	92	38	65.1	0.24
Ozark	85	36	.....	1.60
Pierce City	92	33	67.0	0.20
Princeton	80	40	67.4	2.00
Protem	97	40	69.0	0.48
Savannah	.....	.....	.....	0.30
Saint Charles *a*	.....	.....	.....	0.20
Saint Charles *b*	89	40	65.1	0.61
Shelbina	.....	.....	.....	1.50
Steelville	86	32	.....	0.40
Westport	89	39	.....	.....
Montana.				
Fort Assinaboine	77	45	.....	0.41
Fort Custer	79	46	.....	0.50
Fort Keogh	.....	.....	.....	T.
Fort Maginnis	79	45	.....	0.10
Fort Missoula	93	33	63.5	0.33
Virginia City	92	38	59.5	0.57
Nebraska.				
Ashland	98	32	.....	0.21
Crete *a*	95	35	65.0	0.13
Crete *b*	95	35	61.2	6.13
Creighton	96	33	61.5	.....
Culbertson	100	30	69.0	0.97
David City	.....	.....	61.9	0.00
De Soto *	93	32	62.6	0.64
Fairbury	.....	.....	.....	0.25
Falls City	94	37	65.1	0.55
Fort Niobrara	98	29	59.1	.....
Fort Robinson	99	28	61.2	T.
Fort Sidney	96	28	61.8	.....
Fremont *	94	34	64.0	0.29
Genoa	95	30	59.7	0.00
Hay Springs	94	29	.....	0.02
Kimball	95	31	.....	0.08
Lincoln	94	34	64.2	0.13
Marquette	96	31	.....	0.07
Nebraska City	94	33	62.8	.....
North Loup	92	31	58.9	.....
Palmer	94	28	61.6	0.00
Ravenna	96	26	.....	0.48
Red Willow	.....	.....	.....	1.04
Sargent	.....	.....	.....	1.62
Syracuse	95	39	65.3	0.26
Tecumseh	93	32	63 4	0.30
West Hill	92	34	.....	0.10
West Point	94	.....	.....	0.20
Nevada.				
Fort McDermit	96	40	74.0	0.28

Stations.	Temperature. (Fahrenheit.) Max.	Min.	Mean.	Precip'n.
New Hampshire.	°	°	°	*Ins.*
Antrim	.....	.....	.....	10.45
Belmont	.....	.....	.....	8.96
Berlin Falls	77	18	51.4	.....
Berlin Mills	77	21	54.8	3.77
Bristol	.....	.....	.....	8.06
Chesterfield	80	28	57.7	8.25
Concord	76	28	57.0	10.97
Hanover	75	30	56.0	5.86
Lake Village	.....	.....	.....	9.32
Manchester *a*	78	26	57.2	9.55
Manchester *b*	76	27	57.1	9.02
Mine Falls	78	27	55.5	5.40
Nashua	80	26	56.2	9.54
North Conway	.....	.....	.....	10.13
Pennichuck	.....	.....	.....	9.76
Plymouth	78	24	59.3	8.06
Stratford	82	26	56.8	5.30
Walpole	76	27	54.2	.....
West Milan	80	23	54.0	4.63
Wier's Bridge	.....	.....	.....	9.31
Wolfeborough	.....	.....	.....	8.07
New Jersey.				
Beverly	84	39	63.8	4.10
Billingsport L. H.	80	41	66.1	.....
Bridgeton	82	44	66.1	3.75
Clayton *	80	38	63.1	5.07
Egg Harbor City	82	36	62.8	6.00
Freehold	83	36	62.6	8.20
Gillette	82	32	62.6	10.34
Hanover	81	29	59.7	8.23
Highland Park	82	36	62.0	8.66
Hopewell	.....	.....	.....	8.85
Imlaystown	83	36	62.6	6.09
Locktown	81	38	63.5	7.73
Lambertville	84	43	63.6	9.45
Madison	83	34	60.7	7.78
Moorestown	82	38	63.0	5.30
New Brunswick *a*	78	42	.....	8.17
New Brunswick *b*	80	37	63.3	7.80
Newark	80	42	64.0	6.21
Ocean City	83	50	65.6	5.60
Oceanic	90	43	64.6	10.65
Paterson	82	42	61.9	6.61
Plainfield	83	35	61.4	8.99
Rancocas	.....	.....	.....	5.52
Readington *	84	48	67.0	.....
Somerville	81	40	61.6	7.65
South Orange	81	38	61.2	7.93
Tenafly	83	30	59.3	6.25
Tom's River	90	35	63.0	4.15
Trenton	82	40	68.0	7.60
Union	79	42	61.3	8.12
Vineland	92	49	75.5	3.96
New Mexico.				
Coolidge	91	39	.....	0.40
Fort Bayard	92	49	.....	0.30
Fort Selden	96	47	72.9	2.01
Fort Union	81	39	.....	0.18
Fort Wingate	82	42	62.0	0.42
Gallinas Spring	86	52	67.5	0.08
New York.				
Ardenia	79	39	62.0	7.67
Auburn	76	38	58.5	2.27
Boyd's Corners	79	38	61.6	10.77
Carmel	78	35	60.2	10.92
Cooperstown	75	32	56.0	3.97
Eden	76	32	58.4	4.24
Factoryville	76	32	57.6	3.71
Fort Columbus	82	41	64.2	7.50
Fort Hamilton	80	42	63.3	6.06
Fort Niagara	82	40	61.4	.....
Fort Wadsworth	80	38	61.6	.....
Friendship	.....	.....	52.3	1.02
Geneva	.....	.....	58.0	2.48
Garona	80	31	53.7	2.73
Humphrey	81	37	57.1	3.55
Ithaca	80	34	57.8	2.64
Lyons	80	37	57.9	2.34
Madison Barracks	80	32	57.0	2.59
Middleburg	81	34	.....	4.30
Palermo	79	32	56.0	4.23
Plattsburg B'ks	82	25	53.8	3.76
Palmyra	84	37	59.3	.....
Penn Yan	.....	.....	.....	2.63
Rose	81	36	53.5	3.50
Savona	80	32	53.7	2.73
Setauket	79	45	62.5	6.44
Utica	82	29	56.8	3.58
Waddington	.....	.....	55.5	.....
West Point	81	32	61.5	8.34
White Plains	84	32	62.2	7.60
North Carolina.				
Chapel Hill	90	35	67.7	7.05
Hot Springs	82	34	64.3	.....
Lenoir	.....	.....	.....	10.80
Raleigh	90	45	71.0	9.05
Statesville *	82	34	65.6	13.64
Weldon *	94	36	69.0	10.56
Ohio.				
Akron	80	37	58.2	3.43
Ashland	.....	.....	.....	2.63
Athens	78	32	60.7	3.56
Bangorville	80	30	58.5	1.48
Bellevue	84	40	59.2	1.50
Celina	86	38	61.6	0.75

Meteorological record of voluntary observers, &c.—Continued.

Stations.	Temperature. (Fahrenheit.) Max.	Min.	Mean	Precip'n.
Ohio—Cont'd.	°	°	°	*Ins.*
Circleville	.....	.....	.....	2.08
Clarksville	79	32	61.7	0.76
Cleveland	82	38	59.1	3.02
College Hill*	85	38	63.7	5.00
Collinwood	.....	.....	.....	2.29
Dayton	84	28	62.5	1.34
Demos	77	31	58.6	4.20
Elyria	84	38	70.6	2.07
Ellsworth	.....	.....	.....	3.95
Gracey	.....	.....	.....	3.85
Garrettsville	82	32	55.5	5.13
Georgetown	86	32	63.2	1.62
Greenville	81	34	59.7	0.50
Hanging Rock	84	32	60.3	4.49
Hiram	81	34	58.5	4.61
Hudson	.....	.....	.....	4.45
Jacksonborough	84	38	62.3	1.40
Jefferson	80	36	56.2	4.18
Logan	89	28	60.5	3.27
Lordstown	80	30	57.7	3.86
Marietta	81	34	61.4	4.64
McConnelsville	83	30	61.5	4.68
Napoleon	83	36	60.4	0.16
New Alexandria	79	34	59.2	3.01
New Athens	77	35	.....	.....
New Comerstown	84	31	58.7	4.51
North Lewisburg	87	34	62.8	1.25
Oberlin	90	36	58.0	2.48
O. S. University	82	26	59.7	1.26
Ottawa	.....	.....	.....	1.23
Pomeroy	84	31	64.9	3.20
Portsmouth	82	35	62.4	3.17
Ruggles*	80	41	55.1	2.65
Sidney	85	32	62.0	0.65
Tiffin*	84	41	60.0	1.47
Upper Sandusky	84	35	60.7	1.39
Wauseon	92	30	59.2	0.84
Waynesville	.....	.....	.....	1.57
West Milton	89	36	60.1	1.25
Westerville	80	30	58.6	1.21
Wooster	.....	31	57.1	1.92
Weymouth	.....	.....	.....	4.33
Yellow Springs	80	34	60.6	0.50
Youngstown	82	38	60.9	4.46
Oregon.				
Albany	92	44	64.5	0.64
Bandon*	92	44	57.2	0.61
East Portland*	88	44	.....	0.15
Eola	88	51	64.1	0.54
Fort Klamath	83	38	.....	0.59
McMinnville	89	36	60.3	0.87
Mount Angel	93	42	67.3	0.84
Yaquina Lt. House	87	43	56.6	2.24
Pennsylvania.				
Altoona	79	40	61.3	3.05
Beaver	81	35	58.3	3.20
Bethlehem	79	40	62.0	10.93
Bernice	75	30	54.9	4.22
Carlisle	82	42	63.7	3.29
Catawissa	80	38	63.5	3.74
Charlesville	81	34	56.5	3.37
Clarion	78	32	55.4	2.82
Coatsville	84	34	64.6	6.99
Columbus	84	30	56.3	4.13
Corry*	84	30	50.3	4.13
Coudersport	79	31	56.4	3.00
Drifton	77	35	57.4	7.63
Dyberry	77	29	54.5	6.49
Eagle's Mere	70	32	55.6	6.34
Easton	.....	.....	.....	11.75
Emporium	84	35	59.7	2.57
Franklin*	.....	.....	55.0	4.95
Germantown	80	38	.....	6.41
Girardville	77	38	60.0	8.18
Grampian Hills	80	32	55.2	4.37
Greenville	82	32	56.7	4.07
Hamilton	66	38	59.2	9.40
Hollidaysburgh	83	33	59.0	3.34
Honesdale	75	30	56.1	7.17
Huntingdon	84	34	58.7	4.13
Indiana	82	32	57.4	2.82
Johnstown	83	37	57.2	4.76
Kutztown	83	36	59.5	3.95
Lancaster	84	32	61.6	6.02
Lebanon	81	34	60.7	4.92
Lock Haven	78	34	61.9	4.52
Meadville	78	41	65.7	5.45
McConnellsburg	84	37	58.6	4.03
Montrose	82	34	57.8	4.34
New Bloomfield	84	33	57.8	6.28
New Castle	83	32	60.6	2.84
Philipsburg	79	34	53.5	3.37
Pottstown	81	40	64.3	7.32
Quakertown	81	34	60.9	9.36
Reading	82	34	62.6	7.57
Scranton	78	34	61.5	5.11
Selins Grove	78	32	61.8	5.35
Shamokin	78	35	58.7	5.58
Smethport	80	32	55.0	3.63
Somerset	78	30	53.3	3.26
State College	77	32	57.7	3.12
Swarthmore	81	37	63.0	6.43
Tionesta	83	32	55.7	6.40
Troy	77	37	55.7	.....
Uniontown	80	38	61.9	2.84
Pennsylvania—Con.	°	°	°	*Ins.*
Wellsborough	76	32	55.4	1.75
West Chester	81	36	62.3	7.50
Westtown	83	36	60.8	5.53
Wysox	78	33	56.7	4.40
York	83	35	61.6	4.05
Rhode Island.				
Bristol	76	34	59.4	6.74
Kingston	.....	.....	.....	8.32
Lonsdale	.....	.....	.....	8.80
Newport	78	39	60.4	.....
Olneyville	84	33	61.9	.....
Pawtucket	.....	.....	.....	8.81
Providence *a*	79	34	59.6	9.19
Providence *b*	81	28	59.8	8.76
Woonsocket	78	28	58.4	9.14
South Carolina.				
Abbeville	85	40	69.0	13.66
Allendale	90	41	.....	10.44
Batesburg	90	39	.....	10.44
Blackville	88	38	.....	8.52
Branchville	90	45	.....	5.26
Brewer's Mine	91	52	72.6	13.48
Cedar Springs	85	31	63.8	11.60
Cheraw	90	35	.....	6.31
Chester	90	37	.....	7.03
Clinton	85	46	.....	16.26
Evergreen	.....	.....	70.7	10.50
Florence	91	39	.....	7.28
Georges	92	38	.....	8.93
Greenwood	92	42	.....	17.90
Hardeeville	93	43	.....	7.12
Jacksonborough	92	42	.....	11.83
Kingstree	93	52	.....	9.39
Kirkwood	79	36	67.8	6.52
Marion	88	40	71.4	11.29
Newberry	84	40	70.7	17.90
Spartanburg	84	34	.....	12.30
Stateburg*	88	42	69.9	5.31
Saint Matthews	89	44	.....	5.84
Timmonsville	88	59	78.0	8.55
Trial	90	39	70.0	8.02
Williamston	.....	.....	67.4	9.04
Winnsborough	92	36	.....	13.23
Windsor	86	38	65.0	11.49
Tennessee.				
Andersonville	80	32	64.0	5.38
Ashwood	84	38	67.4	3.42
Beach Grove	86	38	66.7	4.98
Cookville	86	38	68.4	3.34
Covington	84	50	69.1	1.48
Fayetteville	90	36	67.5	3.17
Florence Station	82	40	66.4	3.09
Fostoria	82	30	62.0	2.20
Greeneville	82	35	63.2	3.58
Hohenwald	88	32	68.1	4.10
Jacksborough	82	33	65.6	3.71
Kingston Springs	87	34	68.2	3.40
Lawrenceburg *a*	87	30	63.6	.....
Lewisburg	84	42	69.2	2.41
McKenzie	88	44	68.3	0.40
Milan	88	36	67.0	0.64
Nunnelly	86	32	65.5	3.06
Riddleton	85	37	65.7	6.73
Rogersville	82	37	66.5	4.46
Savannah	84	48	69.4	2.11
Springdale	88	38	64.7	3.51
Trenton	86	40	65.8	1.94
Watkins	88	38	68.0	6.03
Waynesborough	86	36	64.8	2.19
Texas.				
Austin	92	62	78.0	1.16
Cedar Hill	91	59	75.7	4.00
Cleburne*	87	52	74.5	0.45
Colorado City	98	55	.....	.....
Corsicana	.....	.....	.....	2.90
Decatur	90	52	72.1	0.74
Fort Concho	96	53	81.6	0.48
Fort McIntosh	94	57	78.9	4.42
Fort Ringgold	97	56	79.6	5.71
Gallinas	96	52	73.4	1.30
Granbury	91	60	.....	.....
Lampasas	95	54	70.8	1.69
Mesquite	94	52	69.4	2.41
Mexia	90	58	75.0	2.00
New Ulm	92	60	76.5	2.01
Paris	91	51	73.5	1.59
Silver Falls	99	46	73.6	0.27
Vermont.				
Burlington	79	35	58.0	5.68
Brattleborough *a*	79	26	56.5	10.56
Brattleborough *b*	75	29	57.1	.....
Cornwall	.....	.....	.....	3.06
Coventry	80	24	54.0	8.55
Chelsea	69	30	52.2	5.39
East Berkshire	68	27	51.0	2.45
Jacksonville	80	22	53.9	7.80
Lunenburgh	78	25	56.6	5.41
Manchester	76	34	57.3	7.04
Middlebury	76	36	.....	4.82
Newport	.....	.....	.....	4.35
Northfield	75	25	53.3	6.27
Saint Johnsbury	72	27	.....	4.29
Strafford*	76	34	57.4	6.10
Vernon	80	32	58.9	10.94

Meterological record of voluntary observers, &c.—Continued.

Stations.	Temperature. (Fahrenheit.) Max.	Min.	Mean	Precip'n.
Virginia.	°	°	°	*Ins.*
Birdsnest*	88	46	68.5	5.50
Christiansburgh	78	32	.....	8.82
Dale Enterprise*	85	31	64.6	4.40
Fort Monroe	89	40	69.7	5.00
Marion	80	28	62.0	5.78
Summit*	80	32	61.7	.....
University of Va.	.....	.....	.....	13.10
Washington Territory				
Blakely	80	43	59.5	1.16
Fort Spokane	86	46	65.9	T.
Fort Townsend	69	47	.....	0.36
Fort Walla Walla	84	53	.....	0.02
Tacoma	80	45	61.9	1.88
Vashon	85	49	61.2	1.40
West Virginia.				
Hartmonsville	75	32	.....	.....
Helvetia*	80	32	58.6	2.77
Middlebrook	74	30	53.8	.....
Rockport	84	34	62.0	5.10
Parkersburg	80	33	61.2	4.98
West Virginia—Con.	°	°	°	*Ins.*
Tiller Creek	85	32	.....	.....
White Sulph. Sp'gs.	.....	.....	.....	6.31
Wisconsin.				
Beloit	69	46	52.4	1.01
Deuster	83	24	.....	1.35
Fredonia	78	28	54.4	.....
Fond du Lac	80	26	55.6	2.64
Lancaster	84	26	57.7	1.59
Lincoln	.....	.....	.....	5.00
Manitowoc	78	33	57.3	3.63
Madison	78	33	57.8	1.04
Waucousta	68	27	.....	.....
Weston	69	32	56.5	4.37
Cadiz	71	20	.....	2.50
Wyoming.				
Camp Sheridan	86	33	58.6	.....
Fort Russell	.....	26	.....	.....
Fort Bridger	.....	22	.....	0.04
Fort Laramie	87	40	.....	0.02
Fort Washakie	86	33	59.4	0.36
Fort McKinney	86	32	62.7	.....

Mean temperature for 64 years, in degrees Fahrenheit, at the Pennsylvania Hospital, corner Eighth and Spruce streets, Philadelphia, Pa. Monthly values computed from the daily extremes. Data furnished by Lorin Blodget of the Franklin Institute, Philadelphia, Pa.

Year.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Annual.
1825	33.5	35.5	44.8	51.7	62.0	75.5	79.3	70.0	62.5	54.0	41.0	34.0	53.5
1826	34.0	35.5	39.5	48.5	72.0	74.0	73.0	73.0	67.0	55.0	42.0	34.0	53.9
1827	27.0	35.0	42.0	55.0	62.0	71.0	76.0	69.0	63.0	52.0	39.0	35.0	52.1
1828	37.0	41.5	45.0	47.0	66.0	77.0	75.0	76.0	65.0	54.0	46.5	39.0	55.7
1829	30.0	25.0	37.0	53.0	64.0	73.0	75.0	75.0	60.0	55.0	42.0	42.0	52.6
1830	30.0	31.5	41.0	54.5	64.0	72.0	79.5	75.0	67.0	57.0	50.0	37.0	54.9
1831	27.0	28.0	44.5	54.0	66.0	77.0	80.0	77.0	69.0	56.0	43.0	25.0	53.7
1832	33.0	36.0	44.0	51.0	62.0	71.0	74.0	74.0	63.0	55.0	45.0	38.0	53.9
1833	36.0	35.5	40.5	56.0	63.0	65.0	76.0	72.0	66.0	55.0	43.0	37.0	53.7
1834	29.5	42.0	44.5	54.5	64.5	69.0	79.0	75.0	66.0	53.0	44.0	37.0	54.6
1835	32.0	28.0	40.0	53.0	64.5	70.0	76.0	74.0	65.0	60.0	47.0	31.0	53.6
1836	28.0	24.0	36.0	55.0	64.0	66.0	72.0	68.0	65.5	48.0	39.5	29.0	49.6
1837	26.5	30.9	37.8	48.4	60.0	69.0	74.0	68.5	62.5	54.5	44.0	33.0	50.7
1838	36.8	23.6	40.9	46.1	58.2	73.0	78.8	74.9	66.0	49.7	39.1	28.4	51.3
1839	29.5	33.3	41.9	54.3	62.0	66.3	75.2	70.7	63.8	56.6	39.8	34.8	52.4
1840	24.4	39.4	44.0	55.6	62.1	69.4	73.9	74.0	61.5	54.6	43.9	30.7	52.8
1841	33.3	30.4	41.2	48.0	58.7	72.0	75.0	72.4	67.8	49.3	42.0	34.5	52.1
1842	35.1	38.3	47.6	52.5	59.0	68.0	75.8	72.3	64.4	53.0	38.5	32.6	53.1
1843	38.0	28.5	30.3	51.1	60.0	71.0	74.4	75.5	69.0	52.0	39.9	33.9	51.9
1844	27.0	32.0	43.0	56.5	65.5	69.5	75.0	73.5	66.5	53.3	43.5	34.7	53.3
1845	37.0	34.5	44.8	52.0	59.8	71.5	76.0	74.5	65.5	55.8	45.5	28.3	53.8
1846	33.3	29.5	42.7	53.2	64.0	68.8	74.5	74.8	70.8	55.3	49.5	35.8	54.4
1847	32.3	33.2	38.7	51.2	61.8	70.5	76.5	73.5	66.0	54.0	48.3	39.5	53.8
1848	36.7	23.6	39.4	54.4	65.8	73.4	74.8	74.5	64.5	56.2	41.0	43.2	54.8
1849	29.0	27.5	42.5	50.6	58.4	73.5	74.7	74.4	64.4	55.3	51.5	34.4	53.1
1850	35.8	37.1	39.5	48.1	57.7	71.9	77.4	73.0	66.9	56.0	48.0	36.5	54.0
1851	35.2	39.8	43.5	52.0	62.6	70.4	76.8	72.4	67.4	56.6	41.8	30.0	54.7
1852	27.5	34.1	40.7	46.6	63.3	71.8	77.0	72.2	66.8	58.2	43.1	41.9	53.6
1853	33.1	37.3	43.1	52.4	63.5	73.8	75.5	74.6	68.5	53.5	47.9	35.0	54.9
1854	32.2	34.5	43.0	51.2	64.7	71.7	78.7	75.8	69.5	58.7	45.5	31.0	54.7
1855	35.7	27.6	39.0	52.2	61.5	70.2	78.5	73.0	67.6	53.9	48.0	36.7	53.6
1856	24.1	26.1	32.8	53.4	60.0	74.4	79.7	72.8	67.3	55.6	45.4	32.7	52.0
1857	22.4	41.0	39.0	45.3	60.9	69.2	75.0	73.2	66.9	55.8	44.7	40.3	52.8
1858	39.7	29.4	39.9	51.8	59.1	75.2	78.1	73.9	66.8	59.1	41.9	37.4	54.3
1859	34.0	36.9	48.3	50.9	63.9	69.1	75.0	73.4	66.2	52.6	47.5	32.8	54.2
1860	33.1	32.7	45.2	50.3	64.3	72.3	76.5	73.1	65.6	56.7	46.8	32.2	54.1
1861	30.7	39.2	42.2	53.0	59.5	72.5	75.6	73.9	68.3	60.0	44.8	37.0	54.7
1862	32.5	32.7	40.3	50.6	63.7	69.1	75.2	76.7	69.4	58.3	45.2	36.1	54.2
1863	38.2	35.0	37.3	49.8	64.6	68.7	77.1	79.4	64.7	56.1	47.7	35.4	54.5
1864	33.3	36.0	40.5	50.6	67.2	72.0	76.1	79.4	65.0	54.7	45.8	36.8	54.8
1865	26.8	32.6	47.9	56.5	63.4	76.7	77.8	74.7	72.7	54.9	45.3	37.4	55.5
1866	29.3	34.1	40.8	56.1	61.4	73.0	80.4	72.5	69.4	58.3	48.0	33.6	54.7
1867	25.9	40.2	38.0	54.1	59.4	72.2	76.5	75.1	68.2	57.6	47.8	31.8	53.9
1868	30.1	26.6	41.1	48.2	59.7	72.0	80.9	78.4	68.8	54.1	46.9	32.2	53.2
1869	37.0	37.7	39.5	54.4	63.5	73.6	76.5	76.3	67.3	52.5	41.3	37.3	54.7
1870	41.1	34.9	37.9	53.5	65.3	77.2	80.6	78.8	70.5	60.1	46.2	35.5	56.8
1871	31.3	33.9	38.7	48.1	66.3	74.5	76.7	78.5	63.8	57.5	43.4	30.8	53.6
1872	29.7	32.9	34.3	54.3	68.6	76.3	82.3	81.6	70.0	55.3	41.3	28.2	54.7
1873	29.7	30.6	38.4	51.8	63.1	74.1	79.4	75.9	68.7	56.9	39.4	38.4	53.9
1874	37.1	33.7	41.3	44.8	62.1	75.5	78.5	74.7	70.1	58.6	45.2	36.1	54.8
1875	25.7	26.2	35.5	47.7	63.2	72.0	75.5	76.3	60.4	54.3	39.1	35.1	51.7
1876	38.0	34.3	37.1	51.6	62.7	76.6	80.3	75.5	62.5	50.3	45.0	26.9	53.4
1877	28.6	37.4	39.9	51.8	62.8	74.1	78.9	78.3	69.8	58.7	47.1	40.7	55.7
1878	34.4	37.8	48.5	58.1	62.9	69.7	79.8	75.8	69.7	58.4	44.5	33.4	56.1
1879	28.9	30.2	41.3	49.4	64.6	73.2	77.3	74.5	64.7	62.1	43.0	37.8	53.9
1880	39.1	39.0	39.7	53.1	70.6	75.3	77.5	75.0	69.0	54.8	39.2	28.0	55.0
1881	27.0	31.0	39.4	49.7	65.5	68.7	77.9	77.1	76.3	60.3	46.2	41.1	55.0
1882	31.6	36.9	42.2	49.1	56.8	72.8	77.3	73.2	69.1	59.7	41.7	33.1	53.6
1883	28.4	34.1	35.8	49.0	62.2	74.1	76.6	71.9	64.8	54.5	45.2	33.8	52.5
1884	26.9	38.2	39.6	49.4	60.3	72.1	73.2	73.8	71.9	57.3	43.4	34.6	53.4
1885	31.0	24.3	31.3	50.8	60.4	71.7	78.4	72.1	66.0	55.1	45.1	35.7	52.6
1886	28.0	29.7	40.3	53.0	61.3	69.2	74.7	73.5	68.8	57.9	45.8	29.5	52.6
1887	30.2	35.0	35.7	49.7	67.2	70.9	79.9	73.1	63.5	54.4	43.5	35.4	53.2
1888	26.2	32.9	34.7	50.5	60.9	71.8	73.8	75.2	65.4	50.3	.....	.....	.....
Mean	31.6	33.2	40.4	51.6	63.6	71.9	76.8	74.4	66.7	55.5	44.4	34.7	53.7

Table of miscellaneous meteorological data for September, 1888—Signal Service observations.

Stations and districts.	Elevation above sea-level, feet.	Atmospheric pressure: Mean actual barometer.	Departure from normal.	Mean reduced barometer.	Extremes: Highest barometer.	Date.	Lowest barometer.	Date.	Monthly range of barometer.	Temperature of the air, in degrees Fahrenheit: Monthly mean.	Departure from normal. (Max. and min.)	Extremes: Max.	Date.	Mean max.	Min.	Date.	Mean min.	Monthly range.	Daily ranges: Greatest.	Date.	Least.	Date.	Mean relative humidity, per cent.	Mean temperature of dew-point, degrees Fahrenheit.	Precipitation, in inches.	Departure from normal precipitation, in inches.	Winds: Total movement, miles.	Prevailing direction.	Maximum velocity: Miles p. h.	Direction.	Date.	No. of rainy days.	No. of cloudy days.	No. of fair days.	No. of clear days.
New England.										57.9	−3.4														7.47	+4.18									
Eastport	53	29.90	+.02	30.05	30.66	7	29.16	26	1.50	52.8	−2.4	70.8	11	59.8	35.6	30	47.4	35.2	21.5	24	3.5	28	85.7	48.3	5.44	+2.03	5,585	sw.	60	e.	26	10	15	3	12
Portland	99	29.95	+.01	30.05	30.66	7	29.43	26	1.23	55.2	−5.2	77.7	9	62.6	33.2	30	49.0	44.5	23.7	8	2.2	21	86.2	50.9	8.22	+5.32	5,128	sw.	33	nw.	26	11	14	9	7
Manchester	247	29.82	.....	30.08	30.68	7	29.53	26	1.15	55.5	......	77.8	9	65.9	27.0	30	49.0	50.8	30.1	15	3.8	18	82.2	49.8	8.58	......	3,241	nw.	28	n.	26	11	11	9	10
Mt. Washington	6,279	23.86	−.01	30.10	30.64	6	29.37	26	1.27	37.0	−3.8	57.7	17	42.9	14.0	30	31.9	43.7	24.2	7	4.0	22	88.8	33.8	9.48	+1.09	19,415	nw.	116	nw.	14	18	17	7	6
Northfield	871	29.13	.....	30.06	30.65	7	29.56	26	1.09	52.1	......	75.0	9	63.3	25.2	7	45.0	49.8	35.8	7	4.5	21	87.3	48.3	6.27	......	5,228	s.	30	n.	5	14	12	10	4
Boston	125	29.95	+.01	30.08	30.66	7	29.46	26	1.20	59.0	−3.2	80.5	10	66.0	30.2	30	53.6	44.3	25.1	14	2.0	21	77.4	51.6	6.77	+3.93	6,899	n.	60	n.	26	17	15	7	8
Nantucket	14	30.04	.....	30.05	30.61	7	29.08	26	1.53	59.6	......	75.2	1	66.2	41.2	30	55.2	34.0	19.5	8	5.0	23	88.2	55.9	7.30	......	7,989	sw.	50	se.	26	11	16	7	7
Wood's Holl	22	30.05	.....	30.00	30.62	7	29.22	26	1.40	59.0	......	75.8	2	65.0	39.0	30	55.1	36.8	23.0	8	3.8	23	89.5	55.8	11.27	+8.84	9,414	se.	72	n.	26	15	18	5	7
Vineyard Haven	......	......	.....	......	......	..	......	..	....	61.1	......	80.0	17	67.8	40.0	30	54.4	40.0	21.0	2	5.0	24	....	......	11.39	......	......	se.	...	......	..	16	..	..	..
Block Island	26	30.05	.00	30.07	30.63	7	29.25	26	1.37	60.1	−3.2	74.7	11	65.7	44.3	30	55.9	30.4	18.0	29	4.1	4	85.2	55.4	5.49	+2.55	11,176	ne.	68	ne.	26	16	12	8	10
Narragansett Pier	22	......	.....	......	......	..	......	..	....	61.2	......	80.0	10	68.5	32.0	30	53.9	48.0	23.0	30	8.0	21	....	......	7.55	+4.90	......	w.	...	......	..	15	..	..	..
New Haven	107	29.96	+.01	30.07	30.64	7	29.48	26	1.16	59.4	−2.9	78.0	1	68.4	31.8	30	53.8	46.2	25.0	15	3.9	17	84.3	54.6	7.68	+4.19	5,052	n.	28	n.	26	14	13	10	7
New London	47	30.00	+.03	30.05	30.60	7	29.34	26	1.28	60.7	−3.1	78.8	1	67.6	34.8	30	54.2	44.0	21.8	14	5.7	21	82.7	55.2	7.32	+4.10	4,392	n.	30	sw.	21	18	9	17	4
Mid. Atlantic States.										63.6	−3.1														6.17	+2.79									
Albany	85	29.98	.00	30.07	30.64	7	29.60	26	1.04	59.7	−2.8	80.0	17	69.6	36.0	30	52.8	44.0	29.0	15	7.5	21	79.5	53.1	4.68	+1.48	3,009	s.	23	nw.	28	10	15	10	5
New York City	185	29.88	−.00	30.08	30.61	7	29.57	26	1.04	62.9	−0.8	84.2	18	74.2	40.8	30	58.1	43.4	26.1	8	5.4	9	78.0	55.7	7.40	+4.12	5,939	ne.	25	w.	28	15	14	14	2
Philadelphia	117	29.96	−.01	30.08	30.56	7	29.64	26	0.92	63.6	−3.2	81.6	20	73.1	40.5	30	58.5	41.1	24.6	8	6.1	10	79.0	56.6	5.73	+2.44	6,831	nw.	35	ne.	11	14	16	7	7
Atlantic City	34	30.04	−.01	30.07	30.53	7	29.61	26	0.92	64.4	−2.8	80.2	1	71.8	37.0	30	58.7	43.2	25.0	29	5.0	25	85.3	59.8	7.14	+3.99	6,605	ne.	23	s.	11	14	12	8	10
Baltimore	45	30.03	−.02	30.07	30.53	7	29.69	26	0.84	64.0	−3.7	84.5	12	71.9	39.0	30	58.7	45.5	22.1	12	4.7	11	77.0	56.4	4.90	+1.22	3,570	n.	18	nw.	28	16	15	8	7
Washington City	103	29.97	−.02	30.09	30.51	7	29.73	26	0.78	63.2	−4.2	84.5	12	72.1	38.8	30	57.4	45.7	26.5	13	4.2	11	83.8	58.1	6.82	+3.02	3,166	nw.	24	nw.	16	14	15	5	10
Cape Henry	......	......	.....	......	......	..	......	..	....	71.2	......	91.3	5	77.2	49.0	30	65.3	42.3	20.5	27	5.2	24	....	......	4.88	+0.03	......	ne.	...	......	..	16	..	..	..
Lynchburg	658	29.39	−.02	30.10	30.46	7	29.79	26	0.67	62.1	−5.6	84.0	1	73.3	35.4	30	55.9	48.6	31.3	12	4.8	3	81.9	56.4	10.58	+7.36	2,809	n.	16	ne.	30	15	13	11	6
Norfolk	69	29.99	−.07	30.06	30.34	6	29.68	25	0.66	68.6	−1.8	88.1	1	76.2	40.0	30	64.2	48.1	22.4	12	4.1	25	84.2	63.6	6.10	+1.44	6,405	ne.	30	se.	9	22	13	10	7
S. Atlantic States.										71.4	−1.7														8.35	+2.83									
Charlotte*	808	29.24	−.01	30.08	30.34	7	29.80	10	0.54	65.7	−4.3	88.0	13	77.4	38.2	30	60.5	49.8	28.6	27	7.3	10	88.2	62.1	8.25	+5.50	3,909	n.	27	nw.	10	16	18	4	8
Hatteras	11	30.06	.00	30.08	30.29	7	29.63	25	0.66	72.6	−0.8	83.8	1	77.4	50.2	30	69.2	33.6	12.8	26	6.6	28	86.2	68.2	6.63	−0.01	9,074	s.	52	nw.	25	14	8	12	10
Kitty Hawk	......	......	.....	......	......	..	......	..	....	71.6	......	97.0	1	80.2	38.9	30	63.1	58.1	27.1	30	8.1	25	....	......	9.40	+4.22	......	ne.	...	......	..	15	..	..	..
Raleigh	375	29.67	.....	30.06	30.33	7	29.80	10	0.53	66.6	......	88.0	1	76.7	38.8	30	60.4	49.2	29.0	12	3.0	25	83.3	61.0	10.88	......	3,671	nw.	20	n.	25	16	18	3	9
Southport	......	......	.....	......	......	..	......	..	....	74.2	......	87.5	2	80.2	40.4	30	68.2	47.1	23.0	29	5.0	12	....	......	8.14	+2.56	......	sw.	...	......	..	14	..	..	..
Wilmington	52	29.99	−.03	30.05	30.25	30	29.79	25	0.46	71.1	−1.2	87.5	4	80.3	43.9	30	65.4	43.6	24.4	26	4.8	25	86.3	66.8	8.28	+1.44	4,849	ne.	36	sw.	10	16	16	8	6
Charleston	52	29.99	−.02	30.04	30.29	30	29.77	9	0.52	74.0	−0.7	89.0	1	81.2	50.0	30	69.4	39.0	19.4	26	6.9	25	82.0	68.0	5.33	−0.70	6,227	n.	36	s.	9	15	10	11	9
Columbia	......	......	.....	......	......	..	......	..	....	70.2	......	88.5	13	78.8	41.5	30	64.4	47.0	25.0	26	4.5	9	84.5	65.2	5.71	......	......	......	...	......	..	13	16	5	9
Augusta	183	29.87	−.02	30.06	30.34	30	29.65	9	0.69	69.6	−2.8	91.1	1	81.7	41.3	30	64.8	49.8	28.4	27	4.7	16	86.2	65.3	7.66	+4.13	2,768	ne.	25	w.	10	14	14	9	7
Savannah	87	29.94	−.03	30.03	30.28	30	29.70	9	0.58	72.6	−1.4	91.8	1	81.4	47.5	30	67.9	44.3	22.4	26	7.0	25	84.4	67.6	10.34	+5.11	4,596	s.	30	se.	9	17	17	5	8
Jacksonville	43	29.97	−.02	30.02	30.23	30	29.79	9	0.44	74.4	−1.0	92.0	18	84.4	55.0	30	69.5	37.0	24.5	27	6.0	24	85.2	69.4	11.15	+3.26	4,355	ne.	42	s.	9	18	16	9	5
Florida Peninsula.										78.9	−2.2														9.17	+3.64									
Titusville	12	29.99	.....	30.00	30.16	30	29.75	24	0.41	78.4	......	89.5	17	83.9	58.4	30	72.1	31.1	18.9	30	4.1	8	84.8	73.4	6.35	......	7,807	ne.	48	se.	8	14	14	10	6
Cedar Keys	22	29.97	−.03	29.99	30.23	30	29.78	8	0.45	75.4	−2.8	91.0	4	83.5	55.0	30	70.8	36.0	22.0	8	4.7	15	84.2	70.1	12.89	+8.41	7,498	ne.	60	ne.	8	16	15	9	6
Key West	22	29.93	−.04	29.95	30.08	30	29.66	4	0.42	82.4	−1.6	88.7	1	85.6	70.9	19	77.1	17.8	15.9	19	5.3	30	79.1	75.1	5.45	−1.14	6,280	se.	54	ne.	4	13	8	20	2
Jupiter	28	29.94	.....	29.97	30.11	18	29.60	7	0.51	79.8	......	88.8	3	85.2	67.2	21	73.7	21.6	15.1	24	7.6	20	84.8	74.6	8.72	......	6,209	se.	35	s.	8	13	10	10	10
Micco	......	......	.....	......	......	..	......	..	....	80.4	......	93.6	6	87.8	67.9	25	73.0	25.7	18.2	28	9.8	22	....	......	7.17	......	......	se.	...	......	..	10	..	..	..
Eastern Gulf States.										72.0	−2.4														5.25	+1.18									
Atlanta	1,129	28.89	−.04	30.06	30.34	30	29.85	9	0.49	66.6	−3.2	86.9	12	75.9	43.0	30	61.6	43.9	27.5	20	3.0	9	82.0	60.5	14.26	+11.19	5,470	nw.	26	sw.	1	13	12	6	12
Pensacola	56	29.94	−.06	30.00	30.31	29	29.88	16	0.43	74.6	−1.8	89.0	20	83.1	54.3	30	69.3	34.7	20.2	26	7.2	2	81.8	68.6	4.78	−0.86	6,015	ne.	36	w.	1	8	10	9	11
Mobile	35	29.96	−.02	30.02	30.36	29	29.90	9	0.46	72.8	−2.2	90.0	12	83.6	52.0	30	67.9	38.0	23.0	27	8.0	15	86.0	68.4	3.04	−2.17	4,163	n.	26	se.	11	11	13	12	5
Montgomery	217	29.80	−.02	30.03	30.35	29	29.89	9	0.46	71.6	−2.6	90.5	11	82.4	46.2	30	65.3	44.3	26.3	20	2.2	23	77.5	64.0	5.73	+2.94	2,703	n.	21	e.	13	13	11	9	10
Vicksburg	222	29.79	−.03	30.02	30.37	29	29.89	15	0.48	71.0	−3.0	90.2	14	83.3	50.2	29	64.8	40.0	25.5	19	5.9	24	82.6	65.2	1.32	−3.20	2,598	ne.	24	se.	14	7	12	6	12
University	......	......	.....	......	......	..	......	..	....	70.8	......	86.0	20	79.2	48.0	28	62.5	38.0	24.5	19	9.6	7	....	......	4.47	......	......	n.	...	......	..	10	..	..	..
New Orleans	52	29.94	−.02	30.00	30.32	29	29.86	24	0.46	75.2	−1.4	91.0	22	84.9	55.5	30	70.3	35.5	20.0	27	7.7	15	79.0	67.9	4.15	−0.81	4,534	n.	24	n.	29	12	4	10	16
Port Eads	......	29.95	.....	......	......	..	......	..	....	78.0	......	83.0	6	84.4	64.0	30	74.4	19.0	14.4	22	6.2	6	....	......	5.45	......	......	ne.	...	......	..	6	..	..	..
Auburn	......	......	.....	......	......	..	......	..	....	72.1	......	87.0	16	79.0	46.5	29	65.3	40.5	20.5	29	4.0	3	....	......	4.90	......	......	ne.	...	......	..	..	..	..	..
Western Gulf States.										72.7	−2.7														1.59	−3.08									
Shreveport	249	29.79	−.01	30.04	30.40	29	29.92	26	0.48	72.0	−3.0	92.5	11	84.8	53.0	29	63.3	40.5	29.6	27	11.3	21	74.8	63.0	0.91	−3.47	3,316	ne.	24	ne.	23	5	3	12	15
Fort Smith	470	29.58	+.05	30.08	30.41	29	29.93	26	0.48	68.1	−3.6	93.0	9	82.9	48.0	28	59.8	45.0	32.0	28	7.5	21	76.0	59.8	0.50	−3.19	2,182	se.	18	se.	15	3	1	8	21
Little Rock	309	29.75	+.02	30.07	30.42	29	29.92	26	0.50	68.0	−2.8	89.0	20	80.7	50.5	17	61.8	38.5	26.4	28	10.8	23	75.2	60.2	1.33	−1.81	3,156	nw.	19	n.	1	5	2	10	18
Corpus Christi	20	29.99	.00	30.01	30.24	30	29.91	23	0.33	77.9	−1.4	90.7	1	83.9	63.2	27	71.3	27.5	19.0	27	4.7	29	78.9	70.5	7.25	......	6,920	n.	37	ne.	8	11	8	14	8
Galveston	44	29.97	+.01	30.01	30.29	29	29.90	23	0.39	77.5	−1.8	86.7	17	83.0	65.0	30	73.4	21.7	14.1	12	6.0	18	76.8	69.5	3.32	−4.29	7,166	ne.	30	ne.	24	4	10	11	9
Palestine	533	29.49	−.01	30.04	30.36	29	29.92	16	0.44	71.8	−3.4	90.2	12	84.4	52.0	27	62.9	38.2	33.3	27	13.8	1	79.9	65.2	0.27	−3.43	5,028	ne.	22	n.	24	4	5	4	21
San Antonio	781	29.24	+.04	30.05	30.32	30	29.92	16	0.40	72.7	−2.8	92.0	16	84.8	57.7	26	65.7	34.3	26.0	16	10.7	21	73.8	63.0	1.93	−2.26	4,157	ne.	28	e.	12	9	13	8	9
Rio Grande Valley.										75.6	−2.0														6.50	+0.28									
Rio Grande City	230	29.82	+.04	30.07	30.31	30	29.93	22	0.38	75.0	−3.4	98.0	7	89.7	59.0	27	69.4	39.0	30.2	27	4.5	30	82.5	68.3	5.53	+1.46	2,650	ne.	23	se.	9	14	17	9	4
Brownsville	57	29.94	+.02	30.00	30.18	30	29.89	22	0.29	76.2	−0.6	94.0	1	87.3	65.0	25	71.6	29.0	21.0	1	8.4	9	85.6	71.4	7.47	−0.90	4,681	n.	25	n.	29	14	11	7	12
Ohio Val. & Tenn.										63.5	−4.2														2.70	−0.22									
Chattanooga	783	29.25	−.03	30.07	30.36	30	29.86	15	0.50	65.8	−3.4	87.3	20	77.8	37.8	30	59.4	49.5	32.7	12	5.7	15	85.2	61.2	4.42	+0.68	2,926	ne.	24	e.	22	12	10	8	12
Knoxville	980	29.05	−.04	30.08	30.36	29	29.87	16	0.49	64.2	−4.1	85.3	14	75.3	35.0	30	58.5	50.3	29.1	12	2.9	15	84.2	59.0	6.55	+3.81	3,181	e.	18	e.	14	13	11	7	12
Memphis	320	29.72	−.01	30.06	30.41	29	29.88	16	0.53	68.4	−3.4	88.2	20	79.2	50.2	29	62.0	38.0	27.1	19	9.5	5	75.2	60.0	1.06	−2.13	3,698	n.	27	n.	15	4	6	8	16
Nashville	549	29.48	−.01	30.06	30.38	29	29.85	15	0.53	65.0	−3.9	86.5	20	77.2	37.5	30	59.0	49.0	29.8	30	5.0	7	79.4	58.1	3.82	+0.12	3,113	w.	19	ne.	6	10	10	11	9
Louisville	551	29.49	−.01	30.07	30.38	29	29.82	26	0.56	64.4	−4.8	85.7	9	75.7	36.0	30	56.6	49.7	29.5	30	7.9	7	70.9	54.3	2.75	−0.15	4,612	ne.	26	w.	22	8	7	4	19
Indianapolis	766	29.27	+.01	30.08	30.38	29	29.74	26	0.64	60.9	−0.8	87.9	8	74.0	33.7	30	52.4	54.2	33.7	14	8.1	16	65.8	48.5	1.23	−1.46	2,536	ne.	12	w.	27	6	7	9	14
Terre Haute	......	......	.....	......	......	..	......	..	....	63.4	......	87.2	9	75.1	33.2	30	51.8	54.0	34.9	13	11.5	22	....	......	2.11	......	......	sw.	...	......	..	7	..	..	..
Cincinnati	628	29.40	−.01	30.07	30.34	29	29.75	16	0.59	63.4	−5.2	83.4	9	74.0	35.0	30	55.6	48.4	28.2	30	7.8	7	67.6	51.8	1.79	−0.45	4,577	ne.	23	nw.	30	8	7	15	8
Columbus	812	29.22	.00	30.08	30.31	6	29.73	26	0.58	59.4	−5.7	82.4	4	71.0	32.0	30	51.6	50.4	30.3	14	5.9	7	72.4	50.1	0.91	−1.60	4,222	s.	26	sw.	27	5	2	17	11
Pittsburg	847	29.18	−.01	30.07	30.38	7	29.69	26	0.69	60.2	−6.4	81.2	9	69.6	39.2	30	53.6	42.0	30.3	14	6.3	1	75.7	52.0	1.77	−0.80	4,030	nw.	24	w.	27	9	17	9	4
Parkersburg	638	29.40	.....	30.09	30.33	7	29.77	26	0.56	59.6	......	83.4	9	71.1	33.4	30	52.7	50.0	30.6	12	7.0	7	82.4	54.0	5.19	......	2,589	nw.	24	sw.	29	11	6	10	14
Harrisburg	361	29.70	.....	30.09	30.58	7	29.68	26	0.90	60.4	......	80.9	12	68.1	36.5	30	55.2	44.4	22.3	12	5.0	11	81.4	54.4	4.47	......	3,773	nw.	23	nw.	28	9	16	11	3
Lexington	......	28.98	.....	......	......	..	......	..	....	62.4	......	85.0	9	73.2	33.0	30	53.3	50.0	32.9	14	6.2	1	73.0	53.2	1.22	......	4,852	ne.	25	ne.	21	7	6	7	14
Lower lake region.										58.4	−4.7														2.48	−0.63									
Buffalo	690	29.33	+.01	30.07	30.52	6	29.63	27	0.89	58.3	−4.0	80.0	15	66.8	36.3	30	51.2	43.7	30.2	15	7.9	12	77.2	50.8	3.52	+0.24	5,820	sw.	46	sw.	27	12	10	14	6
Oswego	335	29.70	.00	30.06	30.54	6	29.58	26	0.96	57.6	−5.2	78.5	4	64.6	36.0	30	50.9	42.5	27.4	15	4.3	5	76.0	49.8	5.27	+2.65	6,318	s.	30	n.	5	10	9	13	8
Rochester	621	29.41	+.02	30.07	30.55	6	29.60	26	0.95	57.2	−6.0	81.0	9	66.6	35.0	30	49.4	46.0	27.4	15	6.0	5	75.4	49.0	2.19	−0.09	6,235	sw.	31	sw.	27	12	9	11	10
Erie	714	29.30	−.04	30.06	30.44	6	29.63	26	0.81	58.6	−4.6	79.5	9	66.6	37.0	30	52.1	42.5	25.0	15	6.9	1	74.8	50.1	2.86	−1.25	7,541	s.	43	se.	16	12	9	9	12
Cleveland	678	29.34	+.01	30.08	30.38	6	29.63	26	0.75	59.6	−4.4	82.3	8	69.0	38.0	29	52.3	44.3	30.7	14	8.3	27	71.2	49.8	2.65	−0.13	5,276	se.	26	se.	7	12	7	10	13
Sandusky	629	29.40	+.01	30.07	30.37	6	29.66	26	0.71	59.7	−4.4	87.0	11	69.9	39.1	30	53.3	47.9	32.5	11	6.8	5	72.0	50.1	1.41	−1.86	6,335	sw.	27	n.	28	9	6	19	5
Toledo	673	29.35	−.01	30.08	30.38	6	29.64	26	0.74	58.6	−5.1	86.4	11	69.8	37.1	28	50.0	49.3	34.8	2	9.9	27	72.1	48.7	0.68	−2.03	6,598	nw.	32	e.	6	6	9	11	10
Detroit	662	29.30	+.01	30.08	30.42	6	29.62	26	0.80	57.6	−4.1	84.0	8	69.4	35.0	29	50.4	49.0	29.5	2	6.5	27	80.0	51.2	1.26	−1.54	5,791	w.	26	s.	16	11	9	9	12
Upper lake region.										55.2	−3.7														2.56	−1.10									
Alpena	609	29.38	+.00	30.04	30.49	6	29.46	26	1.03	53.4	−2.8	82.0	3	62.4	32.0	29	46.1	50.0	39.5	3	2.0	16	82.6	47.8	2.41	−2.06	6,558	w.	30	se.	7	9	18	3	9
Escanaba	608	......	.....	......	......	..	......	..	....	56.5	......	88.0	11	67.3	28.5	1	45.8	59.5	37.0	1	3.5	18	....	......	3.98	−0.04	......	nw.	...	......	..	15	..	..	..
Grand Haven	620	29.38	+.01	30.04	30.36	23	29.57	30	0.79	54.8	−5.8	74.0	7	63.1	36.9	14	47.2	37.1	28.3	6	4.1	19	78.0	47.6	2.58	−1.49	6,773	sw.	39	w.	27	12	11	7	12
Lansing	883	29.12	.....	30.06	30.42	6	29.61	26	0.81	54.6	......	87.3	11	70.1	32.8	14	44.7	54.5	40.2	14	7.5	18	83.8	49.4	1.91	......	4,040	sw.	24	sw.	11	13	7	10	13
Manistee	......	29.38	.....	30.03	30.43	6	29.49	26	0.94	54.2	......	77.2	10	62.2	35.5	13	47.0	41.7	32.0	14	3.0	16	79.8	47.8	4.98	......	5,400	n.	36	sw.	26	14	11	4	15
Marquette	672	29.30	+.03	30.03	30.40	23	29.47	30	0.93	51.8	−3.2	83.4	3	61.6	35.6	1	46.0	47.8	38.5	1	3.6	16	77.2	44.6	5.41	+0.87	6,661	nw.	32	nw.	8	17	11	10	9
Port Huron	639	29.39	+.03	30.08	30.46	6	29.60	26	0.86	55.9	−4.6	82.0	8	66.9	31.7	28	47.9	50.3	30.4	3	6.9	27	78.8	49.0	1.89	−0.72	7,497	w.	34	sw.	8	6	7	9	14
Chicago	715	29.31	+.03	30.07	30.38	29	29.66	30	0.72	59.6	−5.2	88.2	11	66.8	36.0	29	52.9	52.2	24.7	2	5.5	17	65.5	47.2	0.98	−2.13	6,670	sw.	27	sw.	26	6	8	9	13
Milwaukee	697	29.30	+.01	30.04	30.37	29	29.56	30	0.81	57.0	−3.8	81.8	11	65.7	33.8	29	50.6	48.0	26.4	14	3.8	17	73.0	47.6	0.99	−2.17	5,807	w.	36	w.	8	8	4	9	17
Green Bay	616	29.37	.....	30.04	30.40	23	29.49	30	0.91	55.6	......	80.1	3	66.2	32.4	29	47.7	47.7	32.9	1	8.0	16	78.8	48.6	5.36	......	5,343	s.	36	nw.	17	11	10	11	9
Duluth	672	29.30	+.05	30.04	30.38	23	29.46	30	0.92	53.8	−0.4	78.2	1	63.6	36.1	28	47.5	42.1	28.9	1	4.0	16	77.2	46.5	2.27	−2.15	4,777	nw.	24	w.	26	12	15	9	6
Sault de St. Marie	......	29.32	.....	30.02	30.44	6	29.43	26	1.01	50.6	......	76.0	3	60.3	32.0	29	45.0	44.0	35.8	3	3.8	12	85.2	45.9	3.99	......	4,441	nw.	28	e.	17	13	16	5	9
Extreme northwest.										54.4	+2.0														0.88	−0.70									
Moorhead	926	29.03	+.06	30.04	30.42	28	29.54	30	0.88	54.3	+0.6	87.0	2	69.3	26.5	12	43.9	60.5	46.0	2	5.0	14	69.5	43.2	0.55	−1.56	8,435	se.	48	s.	13	7	11	2	17
Saint Vincent	804	29.13	+.01	30.01	30.44	28	29.55	30	0.89	52.0	+1.6	84.0	2	67.4	24.0	28	41.7	60.0	54.0	2	8.0	14	74.2	43.2	1.22	−0.70	6,731	s.	34	nw.	11	9	13	9	8

Table of miscellaneous meteorological data for September, 1888—Signal Service observations—Continued.

Stations and districts.	Elevation above sea-level, feet.	Atmospheric pressure, in inches and hundredths. Mean actual barometer.	Departure from normal.	Mean reduced barometer.	Extremes. Highest barometer.	Date.	Lowest barometer.	Date.	Monthly range of barometer.	Temperature of the air, in degrees Fahrenheit. Monthly mean.	Departure from normal. (Max. and min.)	Extremes. Max.	Date.	Mean max.	Min.	Date.	Mean min.	Monthly range.	Daily ranges. Greatest.	Date.	Least.	Date.	Mean relative humidity, per cent.	Mean temperature of dew-point, degrees Fahrenheit.	Precipitation, in inches.	Departure from normal precipitation, in inches.	Winds. Total movement, miles.	Prevailing direction.	Maximum velocity. Miles p. h.	Direction.	Date.	No. of rainy days.	No. of cloudy days.	No. of fair days.	No. of clear days.
Ex. northwest—Con.																																			
Bismarck	1,681	28.26	+.08	30.06	30.45	29	29.64	9	0.81	56.1	+ 2.0	92.8	5	74.0	28.6	29	44.0	64.2	45.2	9	12.0	26	64.0	42.5	0.33	− 0.82	7,582	nw.	37	nw.	26	2	2	14	14
Fort Buford	1,900	28.00	+.05	30.02	30.43	29	29.58	9	0.85	56.8	+ 3.4	93.3	2	74.1	24.8	27	44.7	68.5	43.0	30	9.0	19	55.8	39.0	0.62	− 0.11	6,462	nw.	42	nw.	14	5	6	14	10
Fort Totten	1,487	28.42	+.05	30.04	30.43	28	29.60	30	0.83	52.8	+ 2.2	87.0	2	69.4	29.0	12	43.1	58.0	44.0	2	3.8	20	70.0	42.0	0.47	− 0.26	10,359	nw.	46	nw.	7	4	5	8	17
Fort Yates	...	...	...	...	...	..	...	..	...	61.8	...	94.8	5	79.5	25.0	29	44.0	69.8	49.7	9	21.7	28	...	...	0.14	− 0.78	...	nw.	...	...	..	2	..	..	..
Upper Miss. Valley.										**59.3**	**− 3.9**														**1.41**	**− 2.30**									
Saint Paul	831	29.15	+.06	30.05	30.42	29	29.50	30	0.92	55.2	− 2.0	81.2	2	67.7	30.9	29	48.2	50.3	33.3	13	5.1	14	78.9	48.4	1.70	− 1.74	4,047	e.	28	sw.	30	8	7	15	8
La Crosse	744	29.29	+.07	30.09	30.47	29	29.56	30	0.91	55.6	− 4.2	81.7	2	67.8	29.3	29	47.9	52.4	30.9	2	4.4	17	74.2	46.6	1.66	− 3.26	5,236	sw.	32	s.	10	9	8	7	15
Davenport	615	29.41	+.03	30.07	30.46	29	29.71	30	0.75	58.0	− 4.2	85.0	8	70.8	34.2	29	50.8	50.8	30.3	7	4.9	17	75.6	49.4	1.38	− 2.04	4,533	nw.	34	w.	26	8	4	11	15
Des Moines	866	29.16	+.05	30.08	30.48	29	29.75	30	0.73	58.3	− 3.7	90.4	10	72.6	32.0	29	50.0	58.4	39.3	30	4.4	21	71.7	48.6	0.48	− 3.56	3,721	e.	23	nw.	26	7	11	4	15
Dubuque	665	29.36	+.04	30.08	30.43	29	29.65	30	0.78	57.2	− 3.4	83.0	8	70.5	31.0	29	48.8	52.0	33.0	7	4.5	17	77.4	49.6	2.01	− 2.92	3,129	w.	25	nw.	26	9	8	6	16
Keokuk	618	29.41	+.03	30.07	30.44	29	29.82	30	0.62	60.0	− 5.2	87.0	11	73.3	35.2	29	52.3	51.8	34.0	14	4.0	17	72.4	50.4	2.13	− 0.51	4,579	nw.	24	nw.	26	6	5	12	13
Cairo	359	29.69	.00	30.07	30.44	29	29.85	16	0.59	64.8	− 3.6	87.9	20	76.5	42.5	30	58.4	45.4	25.9	30	9.9	22	76.4	56.8	0.28	− 2.37	4,452	n.	24	sw.	16	5	6	12	12
Springfield, Ill.	644	29.41	+.02	30.10	30.46	29	29.76	16	0.70	60.2	− 4.0	88.8	8	74.3	35.7	29	51.7	53.1	32.3	7	6.4	7	72.2	50.6	1.70	− 2.09	5,112	w.	40	w.	8	5	4	8	18
Saint Louis	571	29.47	+.01	30.08	30.45	29	29.79	16	0.66	64.5	− 4.4	89.5	8	76.3	43.0	28	57.0	46.5	30.0	30	6.8	17	69.6	53.8	1.31	− 2.23	6,224	n.	36	nw.	21	5	5	11	14
Missouri Valley.										**60.3**	**− 1.2**														**0.37**	**− 2.82**									
Lamar	1,028	29.03	...	30.12	30.46	29	29.94	15	0.52	64.0	...	88.7	20	78.5	38.5	28	54.9	50.2	36.0	26	12.9	12	77.0	56.0	0.67	− 7.07	3,693	ne.	28	se.	21	3	2	4	24
Springfield, Mo.	1,356	28.67	+.04	30.09	30.49	29	29.88	26	0.61	62.8	...	89.0	8	76.4	40.2	28	55.5	48.8	32.5	26	10.5	21	76.4	54.6	1.89	...	5,174	e.	24	nw.	25	5	1	11	18
Leavenworth	842	29.21	+.06	30.09	30.47	29	29.88	30	0.59	63.8	− 2.0	92.5	20	78.7	38.9	28	55.4	53.6	37.4	30	11.3	12	71.0	53.5	0.84	− 2.79	3,520	n.	22	w.	21	3	3	9	18
Topeka	...	...	...	...	...	..	...	..	...	61.2	...	92.8	8	80.2	32.6	28	51.5	60.2	43.4	18	16.2	12	78.8	53.8	0.57	...	...	...	...	...	..	3	2	10	18
Omaha	1,113	28.92	+.06	30.11	30.49	29	29.78	30	0.71	63.3	− 2.0	95.3	10	74.8	39.1	29	53.2	56.2	37.7	30	10.8	16	70.2	50.6	0.24	− 3.28	5,235	nw.	26	sw.	10	5	11	7	12
Crete	...	...	...	...	...	..	...	..	...	61.2	...	94.8	10	78.5	35.0	30	50.4	59.8	49.7	30	13.4	22	67.8	49.6	0.13	...	...	...	...	...	..	2	4	10	16
Valentine	2,614	27.37	...	30.08	30.43	29	29.62	9	0.81	58.2	...	99.0	9	76.6	28.8	17	45.2	70.2	48.2	9	11.0	26	61.7	42.9	0.06	− 1.53	7,531	n.	48	n.	14	2	3	7	20
Fort Sully	1,600	28.35	+.05	30.04	30.41	29	29.55	13	0.86	59.8	...	94.8	9	77.4	30.2	29	47.5	64.6	46.8	9	7.9	26	52.0	39.7	0.12	− 0.94	6,654	nw.	44	nw.	13	1	1	7	22
Huron	1,307	28.66	+.05	30.06	30.42	29	29.64	30	0.78	56.8	− 0.6	88.0	5	74.7	29.0	12	44.1	59.0	52.0	30	10.2	14	61.6	41.9	0.19	− 1.42	7,776	se.	38	nw.	26	5	2	13	15
Yankton	1,234	28.76	+.07	30.07	30.43	29	29.64	30	0.79	59.2	− 0.3	93.0	10	75.6	35.0	29	49.8	58.0	50.0	30	12.7	14	71.4	49.2	0.50	− 2.68	5,060	nw.	28	nw.	14	4	7	7	16
Wichita	1,354	28.64	...	30.05	30.37	29	29.84	19	0.53	66.2	...	92.3	8	81.0	41.4	17	56.9	50.9	33.2	17	12.4	22	63.8	52.1	1.89	...	4,824	se.	30	nw.	21	4	1	8	21
Kansas City	947	29.10	...	30.10	30.47	29	29.91	30	0.56	64.6	...	92.0	20	78.3	41.2	28	56.2	50.8	32.7	18	13.0	21	71.2	54.4	0.26	...	3,833	nw.	21	nw.	25	3	1	14	15
Northern slope.										**58.7**	**+ 4.6**														**0.58**	**− 0.60**									
Fort Assinaboine	2,720	27.23	+.06	30.03	30.60	24	29.58	12	1.02	59.2	+ 6.0	92.9	12	76.9	33.0	11	45.0	59.9	53.7	12	11.8	26	48.5	35.7	0.41	− 0.88	6,361	sw.	36	sw.	5	4	5	9	16
Fort Custer	3,040	26.91	+.06	30.04	30.51	24	29.61	9	0.90	60.4	+ 7.2	94.3	4	78.6	32.0	27	45.8	62.3	45.9	12	8.3	26	52.2	38.7	0.50	− 0.27	4,460	se.	42	n.	5	3	4	2	24
Fort Maginnis	4,340	25.66	+.07	30.02	30.52	24	29.61	18	0.91	58.6	+ 5.6	89.0	12	72.1	33.0	27	47.0	56.0	43.2	12	9.5	26	45.2	34.8	0.15	− 1.37	5,772	nw.	45	nw.	18	3	3	9	18
Helena	4,069	25.93	+.06	30.03	30.57	24	29.56	17	1.01	61.2	+ 6.6	89.0	2	76.0	41.0	24	49.1	48.0	37.2	20	5.0	18	38.9	32.7	0.14	− 0.35	4,814	sw.	30	sw.	17	4	3	10	17
Poplar River	2,030	27.92	+.07	30.02	30.45	29	29.60	9	0.85	56.4	+ 4.6	91.0	2	76.1	29.0	29	43.0	62.0	47.7	12	12.0	19	59.4	40.2	0.61	− 0.01	5,421	nw.	38	n.	2	4	5	8	17
Rapid City	3,280	26.69	...	30.01	30.37	29	29.56	5	0.81	59.3	...	93.6	9	76.2	35.0	17	47.4	58.6	43.6	30	7.2	26	50.0	38.6	0.02	...	6,094	nw.	48	nw.	13	1	3	7	20
Cheyenne	6,105	24.17	+.08	30.10	30.53	29	29.70	9	0.83	55.3	+ 1.6	87.6	9	74.7	30.3	27	42.4	57.3	42.8	25	18.4	19	45.5	30.6	1.66	+ 0.75	5,829	nw.	33	s.	5	5	6	3	21
Fort Laramie	...	...	...	...	...	..	...	..	...	62.6	...	99.3	9	81.1	29.4	27	44.2	69.9	58.2	9	19.0	6	...	...	0.08	...	...	w.	...	...	..	3	..	..	..
North Platte	2,841	27.17	+.06	30.09	30.50	29	29.71	9	0.79	59.7	+ 0.6	96.0	9	79.4	31.0	17	47.8	65.0	49.6	30	13.9	14	60.6	43.6	0.58	− 1.05	6,283	se.	37	s.	10	2	0	16	14
Fort Washakie	...	24.58	...	30.05	30.40	29	29.72	17	0.68	58.1	...	85.3	9	76.6	34.0	27	42.6	51.3	44.6	16	10.0	19	51.4	37.6	0.32	...	3,700	sw.	41	w.	5	3	1	8	21
Fort McKinney	...	25.11	...	30.04	30.43	29	29.71	4	0.72	60.6	...	88.0	5	73.4	35.0	27	50.3	53.0	36.0	17	5.0	19	55.2	43.6	T.	...	5,966	w.	42	nw.	13	0	5	2	23
Middle slope.										**64.0**	**+ 0.5**														**1.12**	**− 1.14**									
Colorado Springs	...	...	...	...	...	..	...	..	...	58.8	...	87.0	9	76.5	37.2	28	44.6	49.8	41.2	13	20.3	23	53.9	40.0	0.13	...	...	...	...	...	..	3	0	11	19
Denver	5,281	24.89	+.08	30.06	30.46	29	29.68	9	0.78	61.0	+ 0.8	90.0	9	78.7	38.0	27	46.9	52.0	38.9	5	15.0	11	46.4	36.4	0.11	− 0.82	4,193	s.	30	n.	18	3	1	6	23
Pike's Peak	14,134	18.06	...	30.12	30.41	29	29.86	9	0.55	33.6	...	49.3	9	41.1	23.2	20	29.7	26.1	15.4	8	7.5	22	78.7	27.1	0.93	− 0.84	9,432	ne.	64	w.	19	7	5	14	11
Pueblo	4,724	25.39	...	30.04	30.42	29	29.66	9	0.76	63.3	...	96.0	10	82.0	38.0	28	49.2	58.0	44.3	10	14.5	14	42.4	36.0	0.04	...	3,752	nw.	36	ne.	14	1	1	8	21
Concordia	1,384	28.62	...	30.07	30.43	29	29.81	10	0.62	62.7	...	94.0	9	79.6	35.2	28	52.7	58.8	41.4	30	10.5	12	66.0	50.0	1.00	− 2.68	2,688	s.	30	s.	10	3	1	15	14
Dodge City	2,524	27.49	+.07	30.11	30.39	29	29.81	18	0.58	64.4	− 0.1	94.0	19	82.0	41.0	17	53.5	53.0	37.3	15	16.2	14	61.8	49.4	0.78	− 0.50	6,628	s.	40	n.	20	4	0	5	25
Fort Reno	...	...	...	...	...	..	...	..	...	71.9	...	97.0	7	87.1	42.8	28	56.7	54.2	...	..	...	..	...	...	2.43	− 0.92	...	s.	...	...	..	4	..	..	..
Fort Supply	...	...	...	...	...	..	...	..	...	71.6	...	88.2	7	82.7	51.3	28	60.4	36.9	27.2	25	17.4	23	...	...	1.70	− 0.64	...	se.	...	...	..	1	..	..	..
Fort Elliott	2,650	27.34	+.05	30.03	30.36	28	29.72	18	0.64	66.6	+ 0.9	92.8	22	83.8	44.6	28	56.0	48.2	38.8	18	10.9	23	59.2	50.4	0.71	− 1.29	6,237	se.	36	s.	19	2	2	1	27
Southern slope.										**66.1**	**− 2.5**														**0.93**	**− 2.22**									
Fort Sill	1,200	28.84	+.05	30.08	30.38	29	29.87	18	0.51	68.0	− 3.6	91.2	19	84.5	44.5	28	56.3	46.7	40.5	26	18.5	23	69.8	56.8	0.83	− 2.11	5,097	se.	32	sw.	18	7	4	7	19
Abilene	1,748	28.25	+.02	30.05	30.33	29	29.82	17	0.51	72.1	...	94.5	8	86.2	52.0	28	62.3	42.5	31.3	26	15.5	29	70.4	61.0	0.05	− 3.35	5,540	s.	42	se.	20	2	9	3	18
Fort Davis	4,928	25.28	+.02	30.06	30.28	29	29.84	17	0.44	64.2	− 1.4	85.0	19	76.7	46.0	26	56.5	39.0	29.0	27	6.0	29	64.2	50.0	1.68	− 1.32	3,507	ne.	23	ne.	23	10	12	5	13
Fort Stanton	6,154	24.09	...	29.98	30.27	29	29.68	18	0.59	57.0	...	80.5	18	73.1	38.5	27	46.0	42.0	35.0	26	14.0	23	43.8	33.8	1.16	− 2.01	3,541	s.	30	s.	1	4	7	9	14
Southern plateau.										**71.4**	**+ 2.4**														**0.42**	**− 0.83**									
El Paso	3,796	26.25	−.01	29.97	30.21	30	29.70	17	0.51	70.8	− 1.0	94.0	17	85.4	51.2	27	60.7	42.8	34.0	17	13.6	29	52.0	49.6	0.49	− 0.69	3,913	e.	32	ne.	14	9	6	9	15
Lava	...	...	...	...	...	..	...	..	...	70.2	...	94.5	13	87.8	48.8	29	52.5	45.7	42.3	11	30.0	1	...	...	0.55	− 1.07	...	se.	...	...	..	5	..	..	..
Santa Fé	7,026	23.42	+.04	30.08	30.37	25	29.82	16	0.55	60.0	− 3.0	82.5	8	75.7	43.1	28	50.3	39.4	30.5	5	19.5	27	42.4	34.8	0.38	− 1.19	2,867	e.	24	n.	18	4	0	6	24
Fort Apache	5,020	...	...	...	...	..	...	..	...	69.7	...	93.1	15	86.4	48.2	27	53.1	44.9	39.2	11	18.8	22	...	...	0.32	− 1.51	...	sw.	...	...	..	1	..	..	..
Fort Bowie	...	...	...	...	...	..	...	..	...	71.9	...	88.9	17	81.3	53.2	30	61.5	35.7	...	..	...	..	...	...	0.21	− 1.05	...	e.	...	...	..	2	..	..	..
Fort Grant	4,860	25.27	+.02	30.00	30.21	25	29.79	17	0.42	72.3	+ 1.6	90.8	14	83.1	53.1	30	62.2	37.7	29.8	24	13.3	25	34.9	42.0	0.78	− 0.93	5,763	se.	30	w.	18	3	4	4	22
Fort McDowell	...	...	...	...	...	..	...	..	...	85.4	— ...	111.0	8	102.1	60.0	30	68.7	51.0	41.0	8	12.0	18	...	...	0.35	− 1.89	...	e.	...	...	..	2	..	..	..
Fort Thomas	2,710	...	...	...	...	..	...	..	...	79.7	...	100.0	8	94.5	57.2	28	64.9	42.8	36.2	2	20.4	25	...	...	0.55	− 0.49	...	se.	...	...	..	3	..	..	..
Fort Verde	...	...	...	...	...	..	...	..	...	76.5	...	104.0	13	96.1	51.0	30	57.0	53.0	48.0	7	26.0	22	...	...	0.56	− 0.81	...	w.	...	...	..	6	..	..	..
Phœnix	...	...	...	...	...	..	...	..	...	83.1	...	103.0	16	95.4	64.0	19	70.8	39.0	...	..	...	..	...	...	0.23	− 0.47	...	...	...	...	..	3	..	..	..
Prescott	5,389	24.79	+.02	29.98	30.24	29	29.74	10	0.50	65.6	+ 3.6	90.4	8	83.1	46.0	21	52.2	44.4	39.8	15	9.8	22	44.4	39.4	0.62	− 0.77	4,630	se.	40	w.	17	8	7	9	14
San Carlos	...	...	...	...	...	..	...	..	...	81.8	...	104.0	8	99.1	57.0	27	64.5	47.0	39.0	8	26.0	5	...	...	0.63	− 0.16	...	e.	...	...	..	3	..	..	..
Willcox	...	...	...	...	...	..	...	..	...	71.5	...	97.0	18	89.8	41.6	27	53.2	55.4	47.2	20	20.9	1	...	...	0.50	− 0.97	...	e.	...	...	..	2	..	..	..
Yuma	141	29.62	−.04	29.76	29.92	30	29.55	10	0.37	88.2	+ 5.2	110.6	11	104.2	66.6	24	74.2	44.0	37.7	7	13.5	22	47.5	62.0	0.01	− 0.14	3,918	ne.	36	s.	18	1	0	6	24
Keeler	3,622	26.29	...	29.84	30.11	24	29.58	17	0.53	78.2	...	96.1	8	89.9	58.7	19	66.7	37.4	28.5	12	12.9	30	32.0	43.7	0.06	− 0.30	4,299	s.	34	s.	22	2	2	10	18
Middle plateau.										**68.9**	**+ 6.6**														**0.27**	**− 0.39**									
Fort Bidwell	4,640	25.44	...	30.02	30.34	7	29.79	10	0.55	64.9	...	93.4	2	83.4	35.8	26	47.8	57.6	51.2	26	18.8	4	49.8	42.8	0.33	− 0.05	3,389	w.	48	sw.	15	3	4	17	9
Winnemucca	4,344	25.68	+.05	29.97	30.24	24	29.65	4	0.59	67.8	+ 6.6	93.5	15	84.2	40.0	21	48.9	53.5	46.5	8	14.6	30	29.2	28.0	0.24	− 0.07	6,452	ne.	36	e.	29	3	6	5	19
Salt Lake City	4,348	25.68	+.03	29.95	30.20	24	29.71	4	0.49	70.0	+ 6.6	92.3	4	84.3	48.5	19	56.9	43.8	35.0	21	15.3	13	35.2	38.6	0.51	− 0.42	2,947	se.	25	nw.	18	4	1	6	23
Montrose	5,795	24.38	...	29.97	30.27	29	29.68	9	0.58	64.0	...	88.0	9	81.9	40.0	20	48.0	48.0	39.1	22	19.8	19	34.6	32.9	0.16	− 0.89	3,838	se.	34	se.	17	3	1	2	27
Fort Bridger †	6,643	23.66	...	30.07	30.38	15	29.79	9	0.59	59.8	...	81.7	9	77.8	37.8	15	44.3	43.9	38.0	3	22.7	13	47.9	39.5	0.10	− 0.54	2,391	w.	36	w.	5	3	0	11	4
Carson City	...	...	...	...	...	..	...	..	...	64.8	...	89.4	3	81.1	40.7	18	50.2	48.7	43.3	7	5.7	23	50.3	42.6	0.53	...	...	...	...	...	..	5	3	8	19
Brock's	...	...	...	...	...	..	...	..	...	68.1	...	94.0	8	86.9	42.2	26	49.3	51.8	46.3	7	26.1	19	...	...	0.21	...	...	w.	...	...	..	2	..	..	..
Fort Duchesne	...	25.12	...	29.99	30.27	29	29.69	17	0.58	60.2	...	91.3	12	84.7	36.4	27	44.1	54.9	47.3	16	26.2	18	41.4	33.2	0.37	...	2,682	s.	37	sw.	13	2	1	11	18
Northern plateau.										**66.1**	**+ 7.8**														**0.41**	**− 0.50**									
Boisé City	2,750	27.18	+.01	29.97	30.37	24	29.64	12	0.73	67.8	+ 8.0	100.3	3	85.6	40.1	19	50.5	60.2	47.4	11	21.1	30	39.4	39.6	c.06	− 0.42	1,908	w.	18	se.	13	1	3	8	19
Ashland	...	...	...	...	...	..	...	..	...	70.8	...	102.0	14	88.8	40.1	18	52.7	61.9	48.5	25	13.1	30	...	...	0.61	− 0.42	...	w.	...	...	..	6	..	..	..
Fort Klamath	...	...	...	...	...	..	...	..	...	57.8	...	88.0	3	77.6	28.0	23	38.1	60.0	50.0	25	16.0	22	...	...	0.96	− 0.45	...	s.	...	...	..	6	..	..	..
Lakeview	...	...	...	...	...	..	...	..	...	67.4	...	94.0	15	84.5	41.0	22	50.4	53.0	41.0	19	21.5	22	...	...	0.18	− 0.33	...	s.	...	...	..	6	..	..	..
Linkville	...	...	...	...	...	..	...	..	...	63.6	...	90.6	3	79.2	34.0	18	48.0	56.6	41.2	19	10.5	17	...	...	0.98	− 0.77	...	nw.	...	...	..	5	..	..	..
Spokane Falls	1,909	23.03	+.05	30.02	30.52	24	29.72	12	0.80	64.4	+ 7.6	98.1	1	81.4	35.9	23	47.8	62.2	48.2	1	12.1	21	44.8	37.5	0.03	− 1.26	2,363	sw.	18	sw.	20	1	4	8	18
Walla Walla	1,018	28.92	−.03	30.00	30.46	24	29.61	3	0.85	69.9	...	99.8	3	82.6	44.0	23	55.9	55.8	37.7	14	10.5	17	39.4	41.2	0.02	− 0.78	3,641	sw.	25	sw.	4	1	4	7	19
N. Pac. coast region.										**61.6**	**+ 5.2**														**2.05**	**− 1.94**	...								
Fort Canby	179	29.83	+.02	30.02	30.32	23	29.72	11	0.60	59.0	+ 6.8	83.5	25	64.7	49.6	23	54.8	33.9	25.0	14	2.8	20	88.2	55.0	2.14	− 1.79		n.	48	s.	20	10	13	9	8
Neah Bay	...	...	...	...	...	..	...	..	...	52.0	...	72.0	14	65.2	40.0	22	48.8	32.0	...	..	...	..	...	...	3.84	− 3.44	6,533	w.	...	...	..	9	..	..	..
Olympia	36	29.99	−.01	30.03	30.42	24	29.70	11	0.72	60.8	+ 3.6	83.0	14	71.9	41.0	23	49.4	42.0	40.0	14	5.0	20	74.4	51.2	1.67	− 1.43	2,188	s.	12	ne.	13	8	7	8	15
Port Angeles	14	30.01	...	30.02	30.46	24	29.72	11	0.74	55.7	...	77.4	1	63.6	38.0	22	47.5	39.4	24.6	1	4.9	4	82.6	50.0	0.72	...	3,028	s.	24	w.	8	6	9	7	14
Pysht	...	...	...	...	...	..	...	..	...	54.8	...	73.0	1	63.2	37.0	22	46.6	36.0	30.0	25	6.0	18	...	...	2.64	− 3.36	...	w.	...	...	..	9	..	..	..
Tatoosh Island	86	29.93	+.04	30.02	30.40	23	29.74	11	0.66	55.8	+ 2.4	70.2	1	60.9	47.9	10	51.9	22.3	18.9	14	4.5	4	90.8	53.2	3.52	− 2.66	8,679	e.	60	e.	14	13	16	3	11
Astoria	38	29.97	...	30.01	30.31	24	29.70	11	0.61	62.2	...	80.0	25	68.6	49.0	22	56.2	31.0	22.0	10	6.0	30	77.9	54.8	2.32	− 2.58	3,962	sw.	24	ne.	25	9	11	4	15
Portland	80	29.92	−.02	30.00	30.31	24	29.67	11	0.64	65.8	+ 5.0	90.5	2	77.3	43.5	18	54.7	47.0	37.5	27	4.3	30	70.6	54.0	1.13	− 0.77	3,977	nw.	23	nw.	25	7	8	11	11
Roseburg	523	29.45	−.04	30.00	30.26	23	29.67	11	0.59	66.6	+ 5.3	99.1	1	81.1	40.8	23	51.5	58.3	48.7	14	7.7	30	66.2	51.9	0.63	− 0.19	2,394	n.	20	s.	13	5	4	10	16
Mid. Pac. coast reg.										**71.3**	**+ 4.7**														**0.62**	**+ 0.27**									
Eureka	...	29.92	...	29.98	30.13	30	29.72	11	0.41	56.5	...	73.0	15	63.8	46.5	23	50.9	26.5	20.8	20	5.2	28	90.2	53.5	0.06	...	3,565	n.	36	n.	22	3	9	7	14
Red Bluff	342	29.51	−.05	29.85	30.04	30	29.60	11	0.44	81.2	+ 7.2	106.5	11	93.7	55.2	29	66.7	51.3	40.5	13	6.0	15	35.3	46.2	0.33	− 0.25	4,067	n.	31	s.	15	2	1	5	24
Sacramento	64	29.77	−.10	29.84	30.04	30	29.58	10	0.46	73.7	+ 5.4	106.0	11	91.4	50.5	29	59.5	55.5	42.0	10	14.0	15	56.2	54.3	0.55	− 0.30	4,033	s.	24	ne.	15	2	3	3	24
San Francisco	60	29.85	−.04	29.91	30.09	30	29.62	10	0.47	59.0	+ 1.6	87.7	10	70.5	50.1	8	54.8	37.6	34.7	10	5.9	27	83.5	53.8	0.98	+ 0.82	6,958	w.	34	w.	14	2	4	16	10
S. Pac. coast region.										**68.3**	**+ 3.8**														**0.04**	**0.00**									
Fresno	313	29.51	...	29.83	30.05	30	29.56	11	0.59	80.3	...	110.9	11	97.6	54.5	29	63.8	56.4	45.9	7	18.1	30	49.0	56.4	0.06	...	3,561	nw.	24	nw.	15	1	1	6	23
Los Angeles	339	29.50	−.05	29.86	30.03	24	29.68	10	0.35	68.4	+ 4.8	98.2	26	86.6	55.0	18	61.0	43.2	38.0	7	13.4	22	77.7	60.3	0.03	0.00	3,518	w.	23	w.	25	0	2	7	21
San Diego	67	29.79	−.06	29.86	30.02	24	29.69	10	0.33	68.2	+ 2.7	82.0	16	74.8	58.4	19	64.6	23.6	17.8	26	6.0	12	88.6	64.6	0.04	0.00	3,758	nw.	24	nw.	26	1	*11	3	16

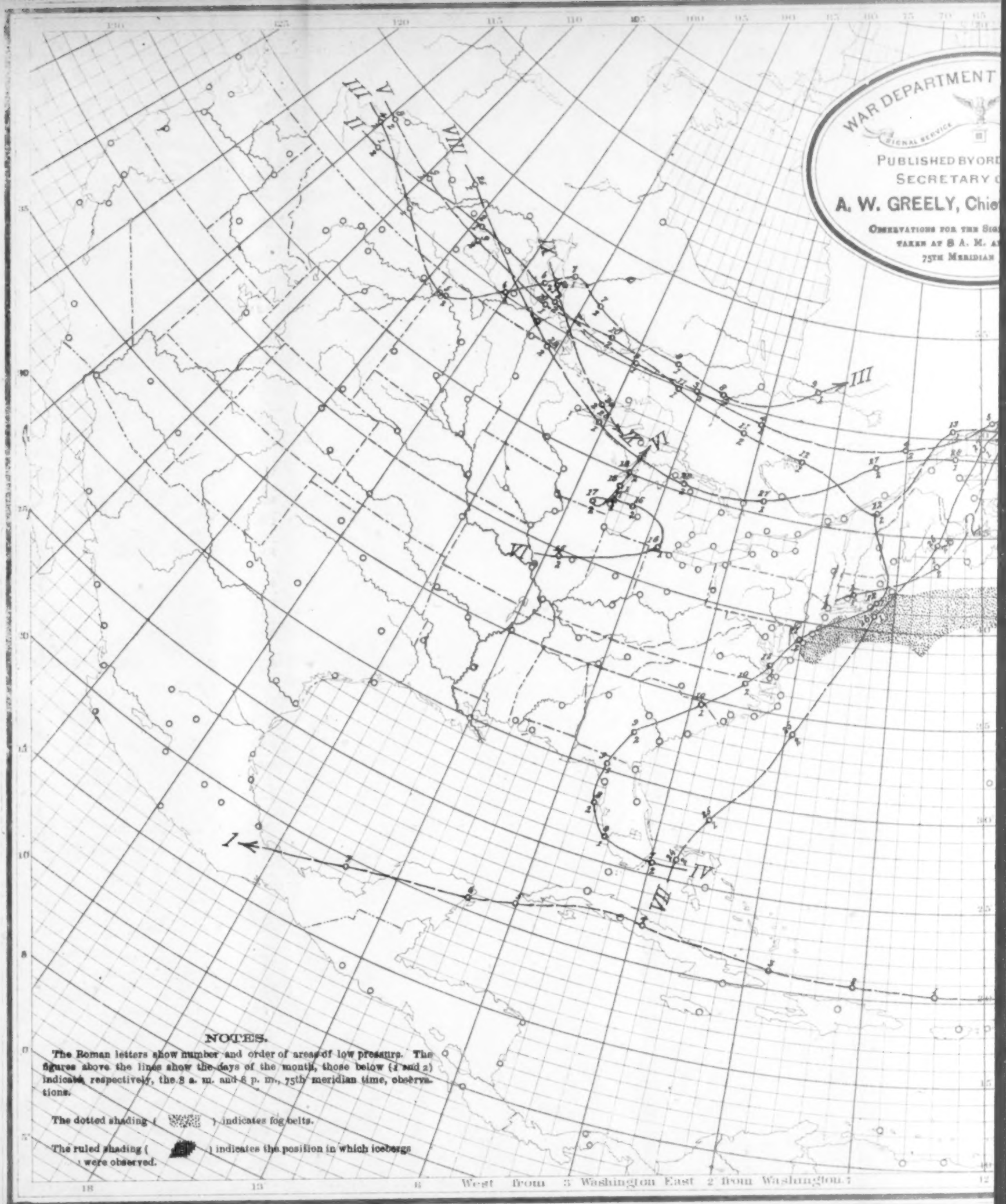
NOTE.—The data at Mount Washington, N. H., Pike's Peak, Colo., and stations having no departures are not used in computing the district averages. * Record for 29 days.
† Record for 15 days.

Record of maximum, minimum, and mean temperatures, in degrees Fahr., at North Lewisburg, Champaign Co., Ohio, for each month during the 57 years beginning with January, 1832, furnished by Mr. H. D. Gowey, voluntary observer, Signal Service.

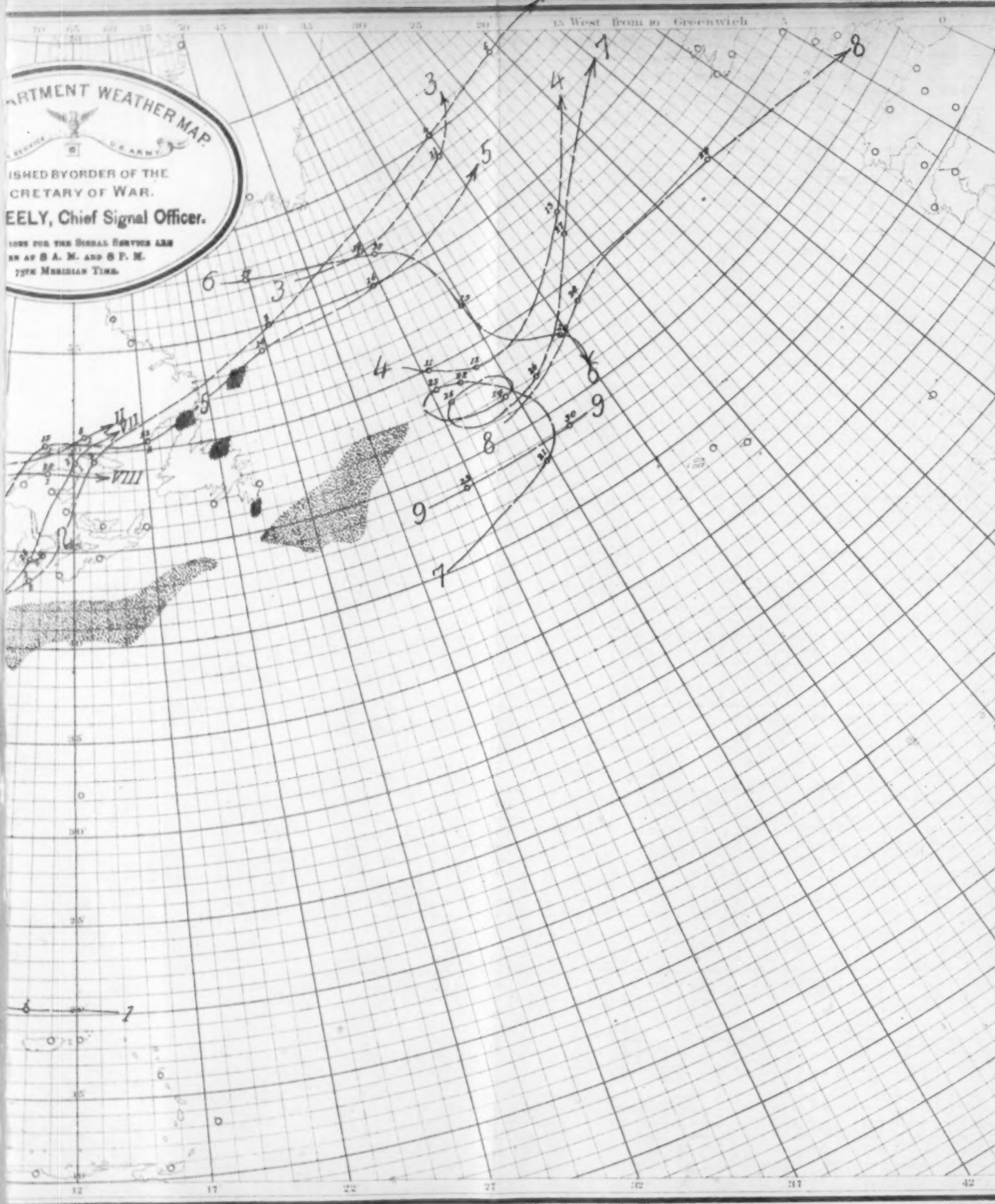
Year.	January.			February.			March.			April.			May.			June.			July.			August.			September.			October.			November.			December.			Annual mean.
	Max.	Min.	Mean.	Max.	Min.	Mean.	Max.	Min.	Mean.	Max.	Min.	Mean.	Max.	Min.	Mean.	Max.	Min.	Mean.	Max.	Min.	Mean.	Max.	Min.	Mean.	Max.	Min.	Mean.	Max.	Min.	Mean.	Max.	Min.	Mean.	Max.	Min.	Mean.	
1832	58	— 5	33	53	— 6	30	69	10	43	....	32	50	81	40	60	87	.....	68	88	53	71	88	53	68	84	39	57	80	37	56	72	37	44	50	14	25	49·41
1833	59	6	33	55	10	30	67	3	39	79	32	56	81	53	66	83	45	68	91	52	73	87	50	70	85	45	64	71	21	51	63	16	42	46	21	35	52·47
1834	49	— 6	19	64	24	38	68	22	42	80	30	55	84	34	58	85	49	68	93	59	75	92	50	72	82	31	63	73	30	51	70	27	43	49	18	32	51·98
1835	51	4	31	66	—17	20	63	— 7	39	77	25	54	87	40	65	80	46	67	84	44	68	82	49	66	80	35	58	74	33	52	65	7	39	53	10	29	47·78
1836	48	1	38	53	— 4	23	57	— 4	34	80	31	53	82	36	64	85	45	67	87	58	72	81	46	68	83	41	68	71	26	45	61	15	36	52	3	28	50·16
1837	49	6	23	54	— 6	33	66	16	39	83	28	45	85	30	59	84	33	66	88	54	72	87	42	70	83	42	63	76	28	56	66	20	44	65	9	31	48·07
1838	64	8	34	36	—10	19	75	8	39	79	24	46	76	30	53	85	49	70	92	54	75	91	57	73	81	39	61	77	28	47	60	7	32	46	— 4	24	48·26
1849	65	7	31	52	1	31	69	—26	39	78	30	57	86	42	59	85	45	67	88	48	69	90	47	67	78	38	59	78	29	53	58	0	33	48	19	31	50·20
1840	46	— 5	22	52	10	41	74	15	45	70	27	55	82	33	62	84	45	67	88	48	69	90	48	68	77	34	67	75	21	55	65	18	40	52	5	29	51·34
1841	50	—11	28	53	1	30	78	8	40	75	31	50	85	38	59	88	45	73	89	53	71	87	50	70	85	42	66	75	27	48	75	16	42	62	12	32	51·14
1842	61	10	35	61	2	33	76	26	48	80	33	56	78	36	58	84	50	64	88	50	72	84	47	69	86	36	66	76	27	51	71	7	33	58	2	30	51·88
1843	66	4	35	51	— 6	22	68	— 2	21	75	28	52	82	35	59	89	39	66	92	49	72	85	50	71	88	42	67	68	18	48	61	19	38	62	12	35	48·96
1844	51	— 3	26	56	11	33	66	16	40	79	26	53	83	32	63	84	39	68	88	57	73	86	51	69	82	39	64	71	24	48	67	15	42	57	14	33	52·24
1845	57	14	33	63	9	36	75	20	42	80	18	56	83	41	60	88	51	70	88	48	71	85	54	74	80	40	64	72	23	50	65	10	40	46	— 4	23	52·08
1846	56	— 6	32	51	— 2	38	62	6	42	83	26	54	84	37	65	85	47	66	93	62	75	83	56	73	87	41	69	77	36	56	66	18	45	62	13	35	54·28
1847	58	— 6	24	56	6	31	61	10	36	76	25	51	79	40	60	84	48	68	88	50	70	85	47	67	87	35	62	73	22	49	68	17	43	59	— 2	32	49·85
1848	60	—16	35	55	12	34	78	4	34	76	27	56	84	40	63	88	45	68	84	50	68	87	53	69	82	33	59	70	28	51	53	18	36	68	15	37	51·51
1849	55	2	28	61	— 6	28	65	25	42	81	22	48	80	34	60	89	53	71	88	55	72	83	53	70	81	38	62	67	33	47	72	22	46	58	2	32	50·84
1850	55	5	33	55	—16	32	59	2	38	72	25	46	81	34	57	85	45	70	90	57	76	87	50	72	83	38	64	73	29	50	72	21	42	56	— 9	31	51·53
1851	57	1	31	57	10	42	69	20	45	71	30	48	86	28	63	85	46	66	89	52	72	84	49	67	90	41	66	70	24	52	69	24	38	58	—12	27	51·95
1852	51	—20	19	54	10	32	72	10	32	84	27	48	85	33	63	90	39	68	94	47	74	89	46	71	82	40	62	79	33	58	67	26	38	56	18	31	51·66
1853	54	7	32	52	— 5	32	67	15	38	76	30	50	87	36	60	92	49	73	89	52	70	91	46	71	87	41	63	72	30	48	66	24	45	52	6	27	51·92
1854	59	— 8	29	61	10	35	70	21	43	85	27	50	86	37	62	93	44	70	97	55	77	97	48	74	88	37	70	77	28	55	59	22	38	55	4	30	53·35
1855	61	— 6	29	52	— 5	32	59	— 1	32	90	17	53	91	32	62	94	41	67	95	55	75	92	46	72	90	38	67	75	25	49	68	19	42	56	— 5	28	50·29
1856	42	—23	11	50	—22	19	57	— 8	27	84	21	52	92	29	58	87	45	71	96	47	75	91	54	66	92	33	62	89	25	53	71	11	38	50	— 4	21	48·88
1857	57	—10	14	70	— 4	38	75	— 7	34	71	14	53	86	29	58	91	44	67	92	45	72	93	47	71	91	30	65	74	21	50	70	—11	35	60	18	35	48·53
1858	60	18	36	54	—13	22	74	— 3	38	80	25	49	83	32	59	87	43	73	90	51	73	94	41	71	90	35	64	86	31	55	59	13	35	55	5	37	51·48
1859	52	— 6	29	52	7	32	70	18	45	79	26	48	88	37	66	92	53	67	96	44	74	95	41	71	82	39	63	80	20	47	72	17	43	52	—10	22	51·02
1860	57	—11	29	66	0	30	72	19	42	84	25	51	90	34	66	93	46	69	90	48	72	92	44	71	85	36	60	80	26	53	73	3	36	43	5	26	50·95
1861	46	3	27	70	1	36	63	0	37	79	22	50	84	33	61	88	45	70	89	51	73	88	47	71	84	37	64	78	24	50	66	21	39	68	12	36	51·73
1862	58	9	29	52	— 2	28	68	13	37	76	30	50	84	34	61	88	47	66	92	52	73	91	43	72	92	34	66	86	20	54	71	20	39	64	5	33	51·12
1863	56	1	32	60	5	32	70	26	36	75	20	50	86	40	64	92	49	68	92	45	74	93	35	72	88	30	68	80	24	47	70	9	42	55	3	32	51·37
1864	64	—16	25	62	— 6	30	69	6	35	78	28	46	88	31	62	95	43	70	95	48	74	95	45	74	95	39	63	68	26	48	68	10	41	57	— 4	27	49·88
1865	42	— 5	18	50	2	30	72	8	43	82	27	53	86	32	61	90	50	74	91	48	71	88	44	69	88	45	72	76	29	50	71	22	38	64	1	31	51·37
1866	61	— 2	25	58	—12	26	64	8	34	76	25	55	88	30	58	88	42	69	91	55	75	93	43	65	82	36	61	75	28	53	59	22	40	51	— 9	26	49·32
1867	46	—15	17	58	—10	34	67	0	31	76	26	51	82	33	58	90	52	73	91	50	73	93	44	73	91	39	68	80	29	54	71	8	45	64	4	28	50·61
1868	48	— 7	21	49	— 4	25	72	0	42	76	17	46	83	34	60	89	44	69	94	58	80	87	50	71	81	32	60	75	19	49	70	21	40	50	— 6	25	49·98
1869	58	16	33	66	8	32	71	1	32	77	21	48	86	35	59	85	40	68	93	52	72	92	48	73	88	36	65	75	20	48	67	16	34	49	15	31	49·62
1870	54	— 4	29	55	— 7	29	58	10	35	84	32	53	89	40	65	93	51	70	94	53	76	95	50	73	92	47	68	76	34	54	69	23	40	53	—12	26	52·07
1871	62	10	31	65	9	33	74	26	46	80	30	56	91	37	64	90	49	71	93	46	72	96	48	74	87	31	61	84	24	55	62	3	37	60	—17	26	52·60
1872	43	— 8	24	52	—12	26	60	4	31	85	25	53	87	32	63	93	48	71	96	59	76	92	46	74	92	35	66	86	29	52	61	1	33	43	—18	30	49·59
1873	56	—26	22	59	— 5	27	66	—10	35	86	30	49	89	37	63	94	50	73	91	52	73	93	51	72	90	33	63	84	24	48	58	9	34	69	12	34	50·05
1874	66	— 3	31	54	0	32	66	17	39	74	20	43	94	34	65	95	40	78	90	50	75	98	50	74	95	40	68	79	25	53	73	—11	38	69	10	32	51·96
1875	41	—14	19	64	—16	19	79	1	35	82	13	46	93	32	61	90	44	68	92	55	73	85	49	67	88	32	61	75	27	50	59	15	37	59	0	28	48·80
1876	70	9	36	68	2	34	73	4	35	79	19	50	90	27	64	89	50	71	91	49	75	89	48	64	81	41	63	77	24	49	76	17	40	48	— 12	19	50·39
1877	56	—20	23	60	18	35	70	5	33	81	27	52	84	30	59	88	48	69	89	50	73	92	50	71	88	44	64	87	33	56	62	11	40	67	14	41	51·81
1878	53	—10	29	60	— 2	32	70	18	45	82	30	57	85	32	60	91	47	66	92	52	76	89	53	72	84	41	64	80	23	51	63	22	41	45	—12	23	52·25
1879	50	—22	22	52	1	25	70	10	38	81	14	49	86	33	65	90	45	71	92	57	75	90	50	70	80	34	60	83	24	54	70	12	41	60	5	29	50·22
1880	66	12	41	64	12	36	64	20	40	81	30	49	85	33	67	89	50	71	93	52	73	89	54	75	86	37	62	76	25	50	60	— 8	29	54	—12	22	51·69
1881	39	— 9	21	48	— 4	26	54	15	34	76	12	44	91	37	66	88	47	68	96	56	76	96	52	74	94	49	72	78	35	57	64	12	42	58	18	36	51·76
1882	54	8	29	57	18	38	67	20	42	78	21	52	78	30	55	88	45	69	86	54	70	84	50	70	83	45	64	76	33	56	66	20	43	44	— 6	27	51·57
1883	46	— 5	22	44	5	22	64	9	32	80	20	49	83	32	60	86	44	70	92	52	73	91	48	70	89	36	63	83	30	53	68	9	42	56	6	41	50·15
1884	49	—23	15	59	— 4	33	65	2	37	78	27	48	83	34	61	94	50	72	90	52	76	92	48	72	96	37	72	87	25	60	64	11	34	56	—20	30	51·60
1885	49	—16	22	53	—17	20	60	— 2	30	80	20	49	85	33	62	92	47	69	99	51	76	94	47	74	86	38	65	79	21	52	67	21	40	55	— 2	32	49·25
1886	53	—14	24	60	—11	28	73	6	40	83	20	55	86	40	65	93	44	70	96	55	78	94	51	73	91	41	68	83	31	56	69	16	40	58	— 1	25	51·83
1887	64	—10	23	60	8	35	66	10	38	86	22	53	91	48	68	95	51	71	102	58	81	100	44	72	94	35	66	83	20	51	68	1	41	58	— 1	30	52·42
1888	57	— 1	24	57	— 1	31	70	8	35	87	28	63	86	33	61	98	42	70	96	53	75	99	47	72	87	34	63	....	....	....	....	....	....	....	....	....	....	....	....	....
Means	54·3	—3·8	27·2	56·1	—0·4	30·2	67·5	8·3	37·6	79·4	25·0	52·7	85·4	34·9	61·4	89·2	46·0	68·9	91·6	51·6	73·4	90·1	48·0	70·8	86·3	37·6	64·3	77·2	26·4	52·0	66·4	13·9	39·2	55·6	2·7	29·8	50·84

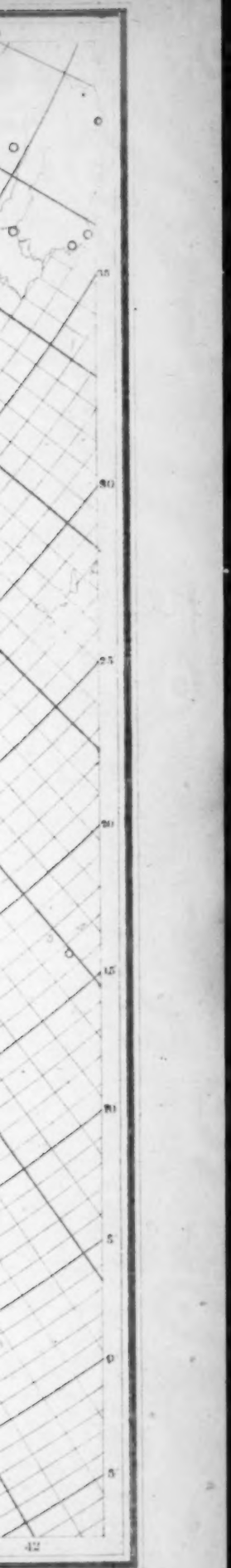
Form 106 C 1884

Chart I. Tracks of Areas of Low


WAR DEPARTMENT
SIGNAL SERVICE
PUBLISHED BY ORD
SECRETARY
A. W. GREELY, Chie
OBSERVATIONS FOR THE SIG
TAKEN AT 8 A. M. A
75TH MERIDIAN
I
II
III
IV
V
VI
VII
VIII
NOTES.
The Roman letters show number and order of areas of low pressure. The figures above the lines show the days of the month, those below (1 and 2) indicate respectively, the 8 a. m. and 8 p. m., 75th meridian time, observations.
The dotted shading ( ) indicates fog belts.
The ruled shading ( ) indicates the position in which icebergs were observed.
West from Washington
East from Washington

s of Low Pressure. September, 1888.





Signal Office Lith

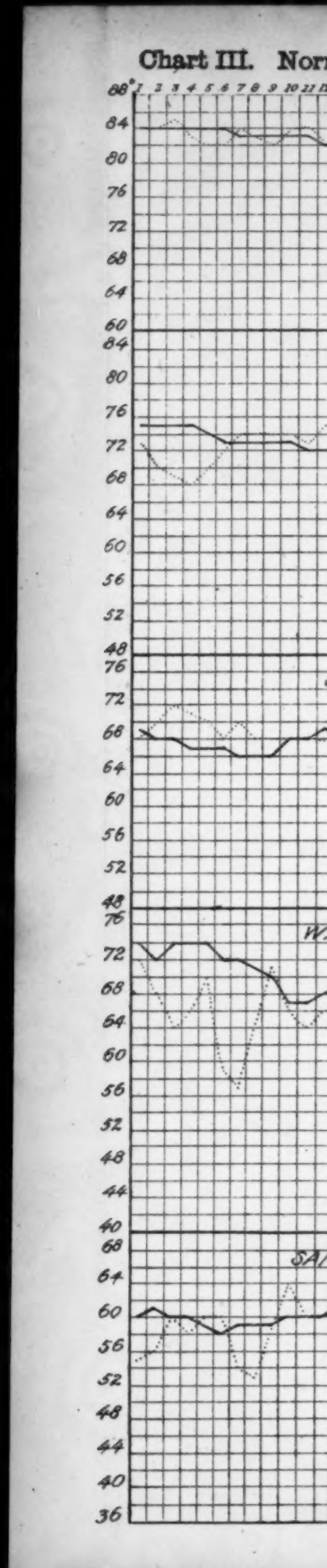


Chart III. Nor
88°
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76
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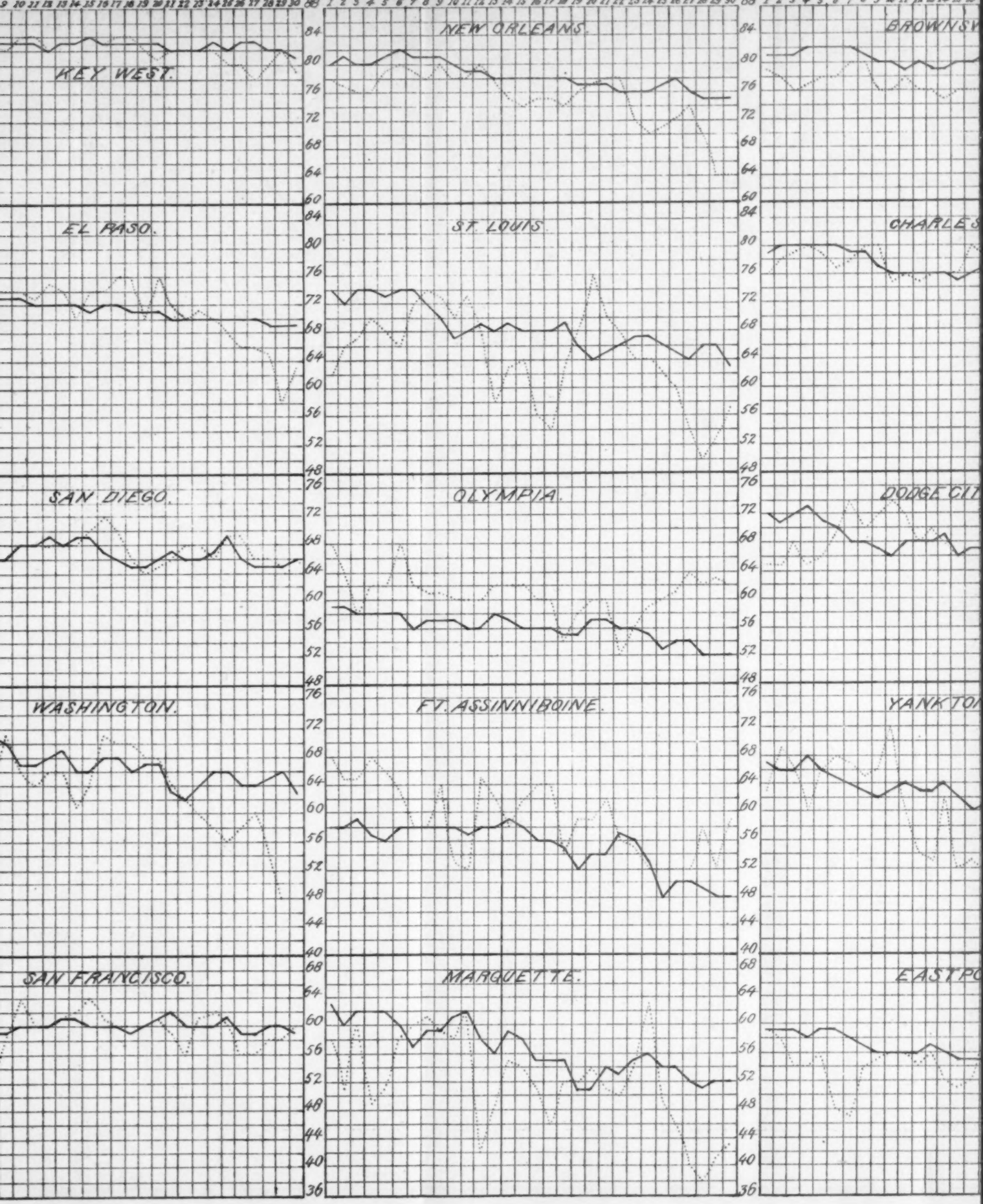
36

Normal September temperatures for a number of years (———). Mean temperatures for Septembe



r September, 1888 (.....).

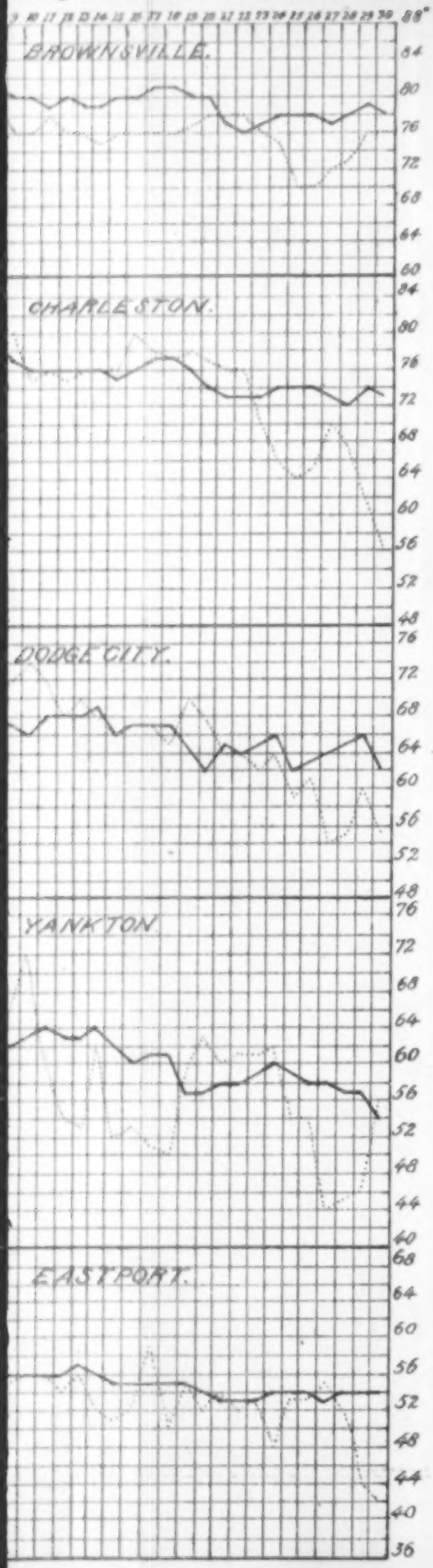
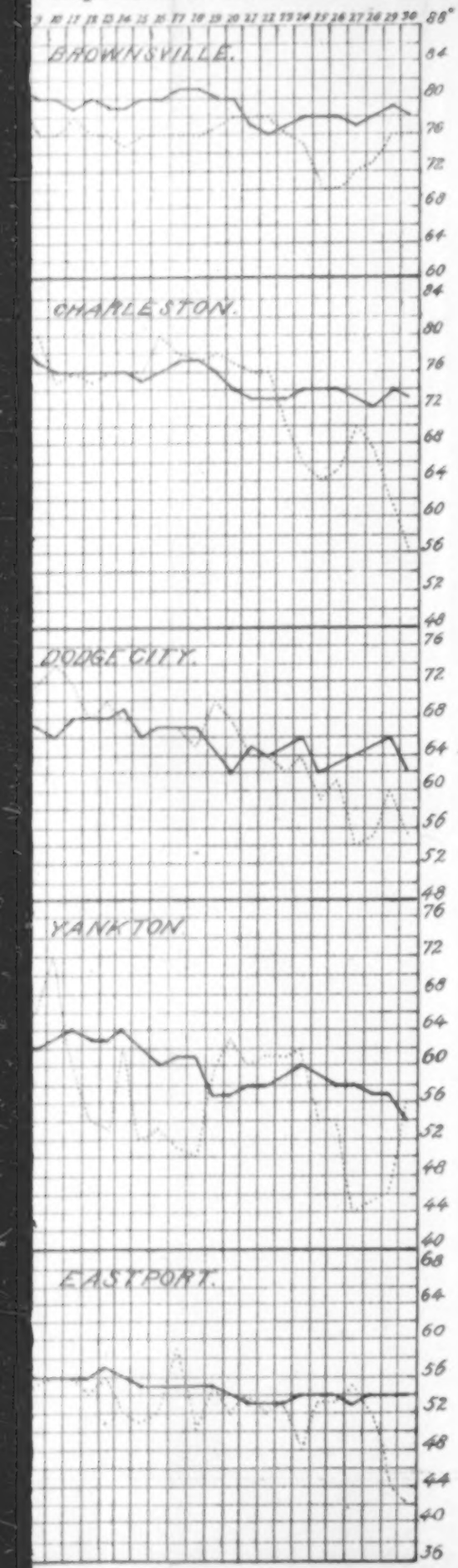


Chart II. Isobars, Isotherms, and Winds, September, 1888.

Form 106 F.

r September, 1888 (.....).



Form 106 F.

Chart II. Isobars, Isotherms, and Winds, September, 1888.

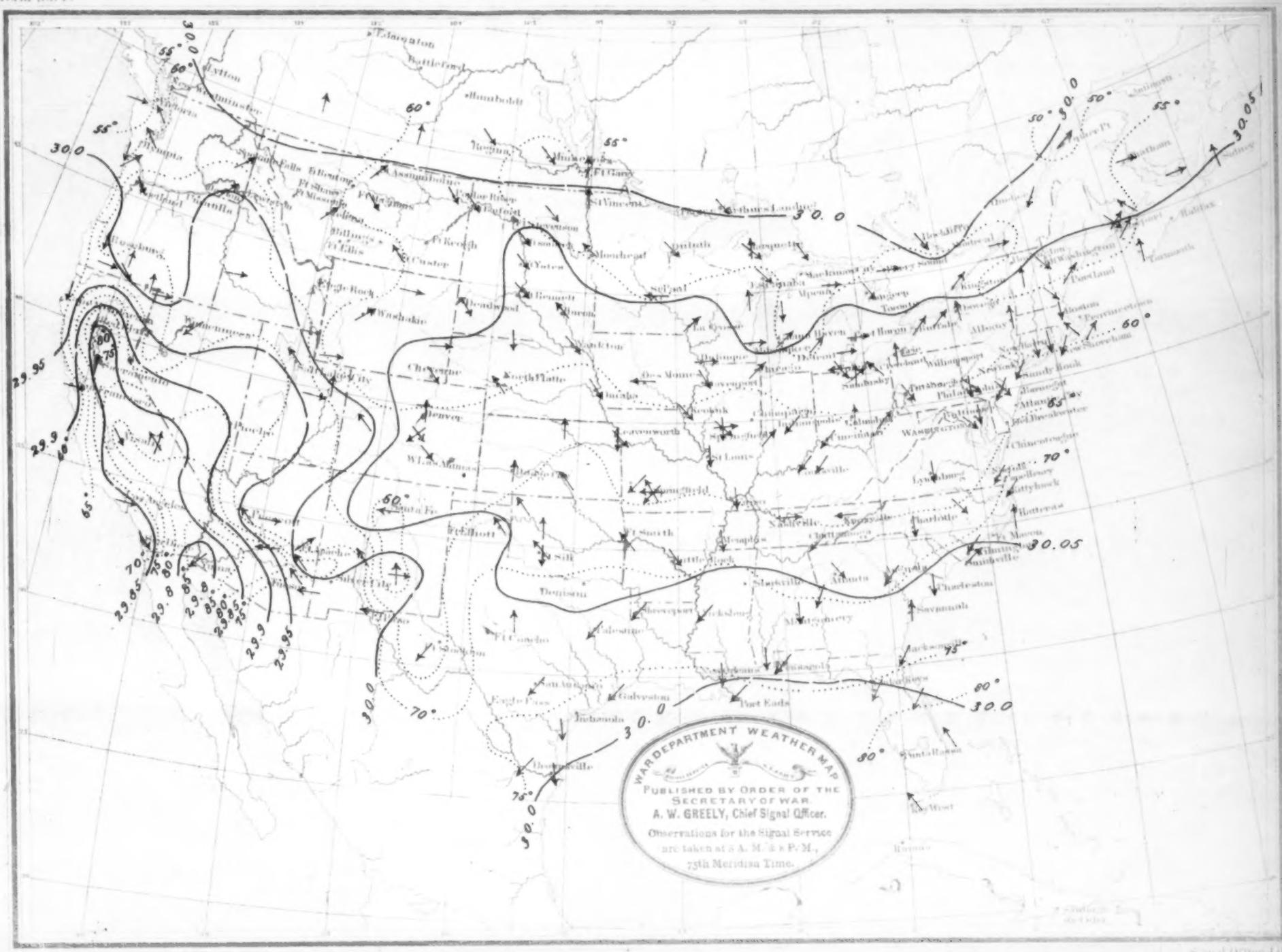
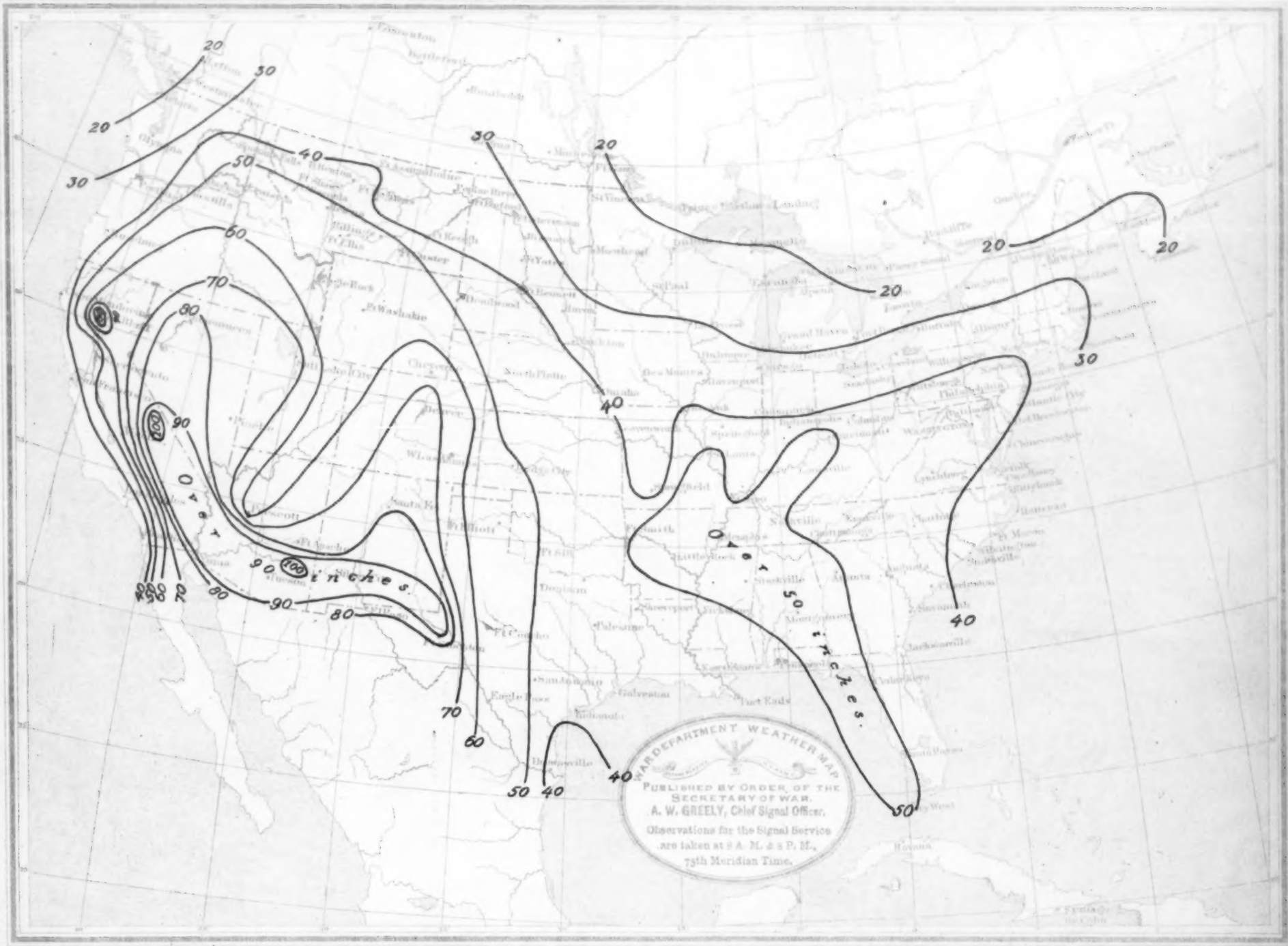
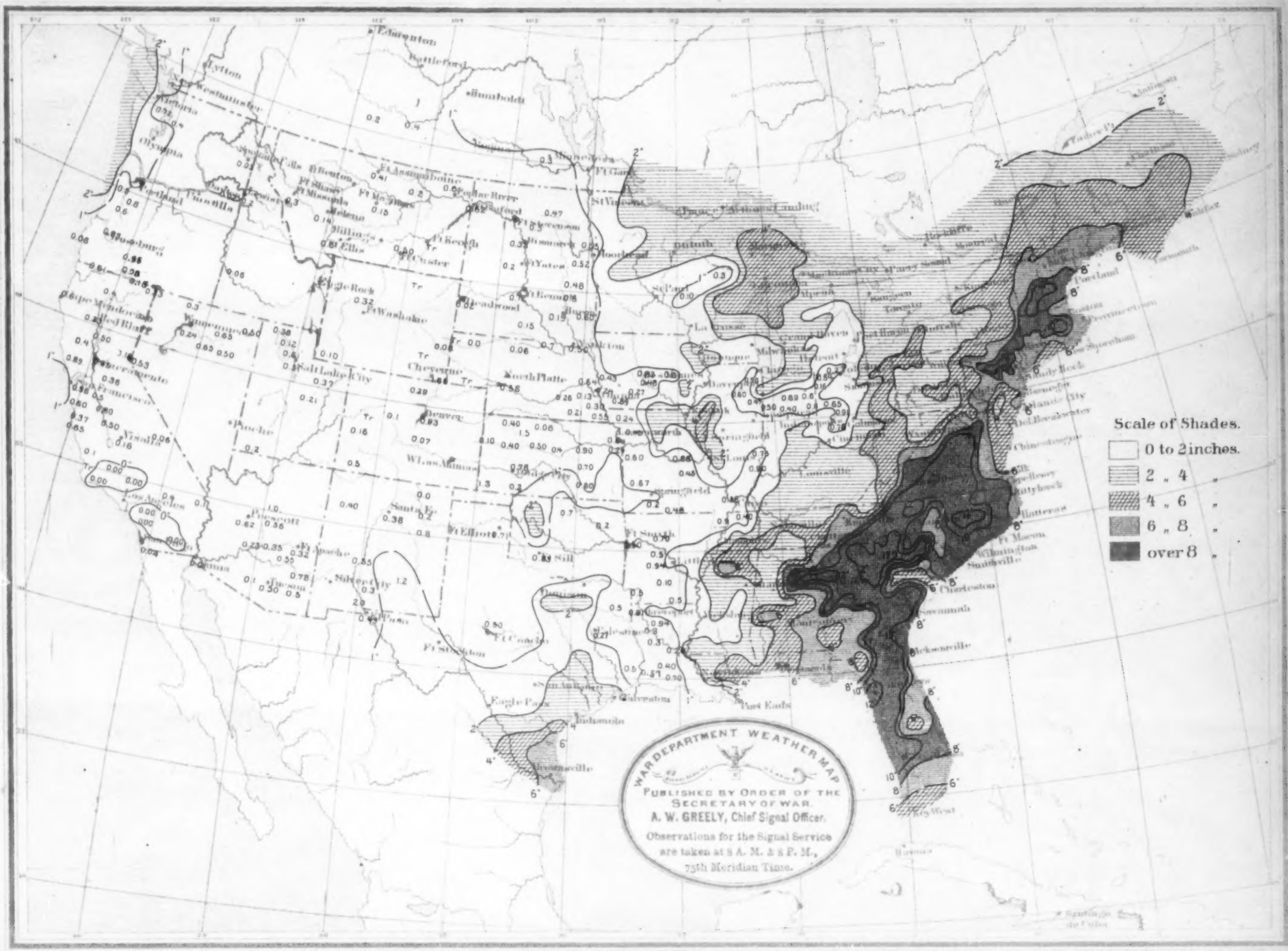

WAR DEPARTMENT WEATHER MAP
PUBLISHED BY ORDER OF THE SECRETARY OF WAR.
A. W. GREELY, Chief Signal Officer.
Observations for the Signal Service are taken at 5 A. M. & 5 P. M., 75th Meridian Time.

Chart VI. Lines of Equal Annual Depth of Evaporation, in inches. Based on observations from July, 1887, to June, 1888, inclusive.



Form 106 P.

Chart IV. Precipitation, September, 1888.


Scale of Shades.
0 to 2 inches.
2 „ 4 „
4 „ 6 „
6 „ 8 „
over 8 „
WAR DEPARTMENT WEATHER MAP
PUBLISHED BY ORDER OF THE SECRETARY OF WAR.
A. W. GREELY, Chief Signal Officer.
Observations for the Signal Service are taken at 8 A. M. & 8 P. M., 75th Meridian Time.

Signal Office Lith

Form 1016 P

Chart V. Normal Precipitation for September, from 18 years observations, 1870 to 1888.

Scale of Shades.
0 to 2 inches.
2 . 4 .
4 . 6 .
over 6 .
WAR DEPARTMENT WEATHER MAP
PUBLISHED BY ORDER OF THE SECRETARY OF WAR.
A. W. GREELY, Chief Signal Officer.
Observations for the Signal Service are taken at 8 A. M. & 8 P. M., 75th Meridian Time.

List of voluntary stations of the Signal Service, with their respective observers, who furnish meteorological reports for the Monthly Weather Review. Those marked with an asterisk (*) did not send reports in time to be used in Review for September, 1888.

Place of observation and observer.

ALABAMA.

Auburn, Alabama Weather Service.
Citronelle, J. G. Michael.
Livingston, J. W. A. Wright.
New Market, Dr. Geo. D. Norris.

ARIZONA.

Antelope Valley, Mrs. J. H. Hamilton.
*Bangharts,
Cedar Springs, J. E. Norton.
*Eagle Pass, B. B. Tripp.
Flagstaff, Braunen & Co.
Globe, J. H. Hamill.
Holbrook, David Rohe.
Huachuca, J. W. Stump.
Prescott Junction, W. W. Burnett.
*Showlow, C. E. Cooley.
Teviston, Miss Belle Tevis.
Tucson, Edward L. Wetmore.
*Williams, J. T. Ryan.
*Willow Springs, F. A. Chamberlin.
*Winslow, L. W. Roberts.

ARKANSAS.

*Eureka Springs, A. H. Foote.
Lead Hill, Silas C. Turnbo.
Little Rock, Arkansas Weather Service.

CALIFORNIA.

Anderson, Dr. A. Fouch.
Banning, Welwood Murray.
Barstow, Geo. R. Gooding.
Georgetown, C. M. Fitzgerald.
*Hydesville, E. T. Foss.
Lewis Creek, John Touhy.
Needles, John J. Clark.
*Nicolaus, Alvah Pendleton.
Oakland, Dr. J. B. Trembley.
Oroville, Hiram Arents.
*Riverside, A. K. Holt.
Salinas, Dr. E. K. Abbott.
Sacramento, S. H. Gerrish.
Santa Barbara, H. D. Vail.
Santa Maria, L. E. Blochman.
Willows, David Bentley.

COLORADO.

*Bennett, I. S. Putnam.
Fort Collins, Prof. V. E. Stolbrand.
Georgetown, W. A. Jayne, M. D.

CONNECTICUT.

Hartford, Wm. R. Matson.
New Hartford, Wm. Goodwin.
Southington, Luman Andrews.
Voluntown, Rev. E. Dewhurst.

DAKOTA.

Brookings, Prof. Lewis McLouth.
Davenport, J. W. Leech.
Gallatin, J. S. Pound.
Garden City, W. C. T. Newell.
Goddard, Mrs. M. F. Goddard.
*Highmore, W. R. McDowell.
Kimball, A. S. Stuver.
Long Creek, Elizabeth Ingalls.
New England City, Lewis A. Dodge.
*Parkston, John J. Swartz.
*Richardton, Prof. A. Nordberg.
Webster, Arthur Betts.
Woonsocket, L. O. Libbey.

DISTRICT OF COLUMBIA.

*Kendall Green, Deaf & Dumb Institute.
Receiving Reservoir, Distributing Reservoir, Rock Creek Bridge } Washington Aqueduct.

FLORIDA.

Altamonte Springs, E. P. Tebeau.
Alva, Chas. E. Robins.
Archer, Dr. J. C. Neal.
Fort Meade, A. H. Adams.
Homeland, J. S. Wade.
*Limona, Mrs. G. K. Mead.
Manatee, Mrs. Mary W. Broberg.
Merritt's Island, Rev. J. H. White.
Tallahassee, Rev. Dr. W. H. Carter.

GEORGIA.

Andersonville, H. W. Bryant.
Athens, Prof. L. H. Charbonnier.
Duck, A. L. Gillespie.
Forsyth, Thos. G. Scott.
Marietta, G. S. Owen.
Milledgeville, S. A. Cook.
Thomasville, C. S. Bondurant.

IDAHO.

Lewiston, Robert Schleicher.

ILLINOIS.

Charleston, J. B. Dazey.
Collinsville, Dr. J. L. R. Wadsworth.
Jacksonville, P. J. Hasenstab.
Mount Morris, Wm. Feary.

Place of observation and observer.

ILLINOIS—Continued.

Oswego, John S. Seely.
Palestine, John E. Templeton.
Pekin, Rev. J. E. Terborg.
Philo, H. A. Burr.
Riley, John W. James.
Rockford, T. D. Robertson.
Sycamore, Roswell Dow.
Sandwich, Dr. N. E. Ballou.
South Evanston, Dr. M. D. Ewell.
Springfield, Illinois Weather Service.
Windsor, A. H. Hatch.

INDIANA.

Butlerville, C. F. Hole.
*Connersville, Robt. Hessler.
Jeffersonville, J. C. Loomis.
Laconia, Lafe Crozier.
La Fayette, Indiana Weather Service.
*La Grange, R. H. Rerrick.
*Logansport, Thos. B. Helm.
Mauzy, Elwood Kirkwood.
Salem, J. W. May.
Scalesville, Urias Wilson.
Sunman, B. F. Ferris.
Vevay, Prof. Chas. Boerner.

INDIAN TERRITORY.

Caddo Creek, P. Leming, M. D.

IOWA.

*Albion, Enoch Lewis.
Amana, Conrad Schadt.
Ames, J. Rush Lincoln.
*Auburn, Edwin Miller.
Bancroft, H. N. Renfrew.
Cedar Rapids, H. D. Olds.
Clarinda, A. S. Van Sandt.
*Clear Lake, Dr. J. C. Wright.
Clinton, Luke Roberts.
Cresco, Gregory Marshall.
Cromwell, E. E. Harrison.
Denmark, G. B. Brackett.
Des Moines, Adolphus Voegeli.
Dysart, Jos. Dysart.
Elkader, J. N. Hamilton.
*Fairfield, Geo. D. Clark.
*Fayette, Upper Iowa University.
Fort Madison, Miss L. A. McCready.
Glenwood, Seth Dean.
Glenwood, A. Schappel.
Grinnell, Prof. S. J. Buck.
Hampton, E. C. Grenelle.
Humboldt, Miss. Florence Prouty.
Independence, Emil F. Wülfke.
Iowa City, Prof. A. A. Veblen.
Iowa City, Iowa Weather Service.
Logan, Mrs. M. B. Stern.
Manson, W. L. Thompson.
Maquoketa, A. B. Bowers.
Monticello, H. D. Smith.
Mount Pleasant, Prof. Max E. Witte.
Mount Vernon, Prof. Alonzo Collin.
Muscatine, J. P. Walton.
Osage, G. D. Pettingill.
Osceola, F. M. Kyte.
Oskaloosa, Joseph Boyd
Oskaloosa, O. H. Avey.
Sac City, Dr. Caleb Brown.
Smithland, Dr. Chas. Rice.
Vinton, T. F. McCune.
Washington, Wm. A. Cook.
*Webster City, Elon Lee.
Wesley, Wm. Ward.

KANSAS.

Allison, John J. Cass.
*East Norway, P. L. Gray.
Elk Falls, Dr. A. C. Williams.
Emporia, Prof. J. H. Dinsmore, jr.
Englewood, C. D. Perry.
Globe, Wm. Featherston.
Havensville, L. W. Dennen.
Independence, J. M. Altaffer.
Lawrence, Prof. F. H. Snow.
Lebo, C. W. Burnet.
Leoti, L. C. Vickrey.
Manhattan, C. P. Blachley.
Morse, R. P. Edgington.
Ninnescah, E. Shaw.
Salina, J. H. Gibson.
Topeka, Kansas Weather Service.
Tribune, S. B. Jackson.
Wakefield, Wm. P. Cochran.
*Wellington, John H. Wolfe.
*Wilson, Miss Lizzie Dolphin.
Yates Centre, F. R. Gray.

KENTUCKY.

Bowling Green, M. H. Crump.

Place of observation and observer.

KENTUCKY—Continued.

Carlisle, W. H. Fritts.
Elkin, Chas. Ogden.
Frankfort, E. C. Went.
Louisville, Kentucky Weather Service.
Millersburg, C. Pope.

LOUISIANA.

Grand Coteau, Rev. C. M. Widman.
Liberty Hill, E. A. Crawford.
Luling, F. M. Rogers.
New Orleans, Louisiana Weather Service.
*Port Eads, Mrs. C. L. Kleinpeter.

MAINE.

Bar Harbor, Joseph Wood.
Cornish, Silas West.
Gardiner, Henry Richards.
Kent's Hill, W. C. Strong.
Orono, Prof. M. C. Fernald.

MARYLAND.

Barren Creek Sp'gs, Albert E. Acworth
Cumberland, E. T. Shriver.
Fallston, Prof. G. G. Curtis.
Gaithersburg, John T. De Sellum.
Great Falls, Washington Aqueduct.
McDonogh, McDonogh Institute.
M't St. Mary's, M't St. Mary's College.
Woodstock, Woodstock College.

MASSACHUSETTS.

Amherst, Miss S. C. Snell.
Amherst, Massachusetts Agricultural Experimental Station.
Blue Hill, Rev. A. K. Teele.
Blue Hill Observatory, A. L. Rotch.
Cambridge, Harvard College Obs'y.
Dudley, Conant Observatory.
Deerfield, Rev. A. Hazen.
Fall River, C. V. S. Remington.
Heath, B. B. Cutler.
*Marion, J. E. Hadley.
Nahant, Wm. D. Hodges.
Newburyport, T. V. Pike.
New Bedford, Thomas R. Rodman.
Provincetown, John R. Smith.
Somerset, Elisha Slade.
Taunton, E. U. Jones, M. D.
Westborough, G. S. Newcomb.
*Williamstown, Williams College Obs.
Worcester, J. B. Hall.

MICHIGAN.

Benton Harbor, A. J. McCave.
Birmingham, S. Alexander.
Harrisville, Dr. D. W. Mitchell.
Hudson, Major A. H. Boies.
Kalamazoo, W. A. Black.
Lansing, Dr. H. B. Baker.
Lansing, Michigan Weather Service.
Marshall, W. T. Drake.
Mottville, J. A. Hartzler.
Thornville, John S. Caulkins.
Traverse City, S. E. Wait.

MINNESOTA.

*Argyle, J. J. Stone.
Le Sueur, L. B. Davis.
Minneapolis, Wm. Cheney.
Northfield, Minnesota Weather Service.

MISSISSIPPI.

Biloxi, Dr. R. G. Hinsdale.
*Jackson, W. J. Brown, Jr.
Palo Alto, W. H. Hill.
University, Mississippi Weather Service.

MISSOURI.

Conception, Rev. M. Eckstein.
*Fayette, Prof. T. Berry Smith.
*Frankford, W. W. Vermillion.
Pierce City, J. J. Spilman.
Princeton, Wm. Hirons.
St. Louis, Missouri Weather Service.
*Warrenton, Prof. J. H. Frick.

MONTANA.

Virginia City, Eugene Stark.

NEBRASKA.

Crete, Nebraska Weather Service.
Culbertson, G. D. Carrington.
De Soto, Chas. Seltz.
Fairbury, Dr. J. Humphrey.
Falls City, A. B. Newkirk.
Fremont, Rev. L. F. Berry.
Genoa, Geo. S. Truman.
Hay Springs, Wm. Waterman.
Kimball, Wm. G. Barton.
Lincoln, University of Nebraska.
Marquette, John Ellis,
Syracuse, P. W. Risser.
Tecumseh, W. L. Dunlap.

Place of observation and observer.

NEVADA.

Carson City, Nevada Weather Service.

NEW HAMPSHIRE.

Antrim, Frank W. Palmer.
Berlin Mills, Q. A. Bridges.
Concord, W. L. Foster.
Nashua, Chas. H. Webster.
*Ashland, Belmont, Bristol, Lake Village, Weir's Bridge, Wolfeborough. } Lake Winnipiseogee Cotton and Woolen Manufacturing Co.

NEW JERSEY.

Beverly, C. F. Richardson.
Clayton, W. T. Wilson.
Egg Harbor City, H. Y. Postma.
Moorestown, Thos. J. Beans.
New Brunswick, New Jersey Weather Service.
Readington, John Fleming.
South Orange, Dr. W. J. Chandler.
*Vineland, Dr. O. H. Adams.

NEW MEXICO.

*Albuquerque, S. M. Rowe.
Coolidge, H. M. Moran.
Gallinas Spring, J. E. Whitmore.
*Las Vegas, F. W. Chatfield.

NEW YORK.

Ardenia, Richard B. Arden.
Auburn, Geo. Casey.
Boyd's Corners, Thomas Manning.
*Brooklyn, Prof. W. C. Peckham.
Cooperstown, G. Pomeroy Keese.
Eden, W. P. Hunt.
Factoryville, T. P. Yates.
Friendship, Jesse D. Rogers.
Geneva, Mrs. C. K. M. Yates.
Humphrey, Chas. E. Whitney.
Ithaca, Cornell University.
Ithaca, New York Weather Service.
*Le Roy, Prof. F. M. Comstock.
Lyon, Dr. M. A. Veeder.
*New York, Central Park Observatory.
*North Volney, J. M. Patrick.
Palmyra, L. D. Cummings.
Penn Yan, Geo. R. Young.
Rose, George Smart.
Savona, M. S. Collier, M. D.
Setauket, Selah B. Strong.
*Syracuse, John F. Boynton.
Utica, Thomas Birt.
Vermillion, E. B. Bartlett.
White Plains, Prof. O. R. Willis.

NORTH CAROLINA.

Chapel Hill, Prof. J. W. Gore.
*Copal Grove, M. Ritchie.
Hot Springs, Dr. W. F. Ross.
Lenoir, Dr. R. L. Beall.
*Marion, A. Blanton.
Raleigh, Thos. C. Harris.
Raleigh, North Carolina Weather Service.
Statesville, W. A. Eliason.
*Tarborough, E. V. Zreller.
Weldon, T. A. Clark.

OHIO.

Bellevue, Wm. Sheffield.
Cleveland, G. A. Hyde.
College Hill, John W. Hammitt.
Collinwood, Wm. Smeed.
Columbus, Ohio Weather Service.
Elyria, C. W. Goodspeed.
Garrettsville, S. M. Luther.
Jacksonborough, Dr. J. B. Owsley.
Lordstown, W. S. Dean.
Napoleon, Dr. T. C. Hunter.
New Athens, T. M. Sewell.
North Lewisburg, H. D. Gowey.
Portsmouth, Dr. D. B. Cotton.
Ruggles, Peter Bowman.
Tiffin, Rev. T. H. Sonedecker.
Wauseon, Thos. Mikesell.
Westerville, Prof. John Haywood.
West Milton, Luke S. Motte.
Yellow Springs, Chas. W. Rice.

OREGON.

Albany, John Briggs.
Bandon, Geo. Bennett.
East Portland, Dr. Geo. Wigg.
Eola, Thos. Pearce.
*La Grande, J. K. Romig.
McMinnville, Prof. W. J. Crawford.
Mount Angel, Rev. F. Barnabas Held.
Yaquina L. H., Dr. John G. Jessup.

List of voluntary stations of the Signal Service, with their respective observers, who furnish meteorological reports for the Monthly Weather Review—Cont'd.

Place of observation and observer.

PENNSYLVANIA.

Altoona, Chas. B. Dudley, M. D.
Catawissa, Robt. M. Graham.
Derry, Wm. Loveland.
Driftoo, H. D. Miller.
Dyberry, Thos. Day.
*East Brook, L. E. Stunkard.
Easton, Dr. J. W. Moore.
Franklin, Joseph Bell.
Germantown, Thos. Meehan.
Grampian Hills, Nathan Moore.
*Indiana, McL. W. Davis.
Johnstown, E. C. Lorentz.
Meadville, David Logan.
Philadelphia, Pennsylvania Weather Service.
Phillipsburg, L. Ray Morgan.
Quakertown, J. L. Hesseck.
Reading, C. M. Deehant.
Salem Corners, T. B. Orchard, M. D.
State College, Agricultural Experimental Station, State College.
Troy, M. Gustin.
Wellsborough, Hiram D. Demitt.
West Chester, Dr. Jesse C. Green.
Westtown, Wm. F. Wickersham.

SOUTH CAROLINA.

*Aiken, Dr. W. H. Geddings.
*Black's, Jos. Black.
Cedar Springs, J. T. Beverly.
Columbia, South Carolina Weather Service.
*Graham's Turnout, R. H. Soonting.
Kirkwood, Colin Macrae.
Statesburg, Dr. W. W. Anderson.

TENNESSEE.

Ashwood, Rev. C. F., Williams.
Austin, P. B. Calhoun.
Milan, Dr. M. D. L. Jordan.
Nashville, State Board of Health.

Place of observation and observer.

TEXAS.

Austin, Oscar Samosta.
Cedar Hill, J. P. Berry.
Cleburne, Dr. T. C. Osborn.
Colorado, Fred R. Blount.
*Comanche, E. N. Wiesendanger.
Corsicana, W. H. Hamilton.
Decatur, H. D. Donald.
Gallinas, Lum Woodruff.
Galveston, Texas Weather Service.
Lampasas, Dr. C. M. Ramsdell.
Mesquite, Silas G. Lackey.
Mexia, Chas. F. Mercer.
*Midland, J. C. Rathburn.
*New Ulm, C. Runge.
*Pine Mills, W. E. Burkett.
Silver Falls, C. M. Tilford.
*Santa Maria, L. E. Blochman.

VERMONT.

Brattleborough, W. H. Childs.
Burlington, W. B. Gates.
Lunenburg, Dr. Hiram A. Cutting.
Manchester, Rev. E. P. Wild.
Middlebury, S. Holton.
Saint Johnsbury, F. Fairbanks.
Strafford, H. F. J. Scribner.

VIRGINIA.

Bird's Nest, C. R. Moore.
Christianburg, H. D. Walters.
Dale Enterprise, J. L. Heatwole.
Marion, A. T. Lincoln.
*Petersburg, Jas. M. Colson, Jr.
*Rappahannock, W. H. Ireland.
Summit, J. R. Sim.
University of Va., James Wearmouth.
*Variety Mills, J. H. Micklem.
Wytheville, Howard Shriver.

WASHINGTON TERRITORY.

Blakeley, R. M. Hoskinson.
Tacoma, E. N. Fuller.

Place of observation and observer.

WASHINGTON TERRITORY—*Continued.*

Yashon, Mrs. C. B. Carpenter.

WEST VIRGINIA.

*Clarksburg, R. T. Lowndes.
Hartmonsville, W. U. Tobb.
Helvetia, Dr. C. T. Stucky.
Middlebrook, S. F. H. Hewit.
Parkersburg, T. G. Field.
White Sulphur Springs, T. Surber.

WISCONSIN.

Beloit, Beloit College Observatory.
Delavan, George L. Collie.
Deuster, G. H. Kruschke.
*Embarras, J. E. Breed.
Fond du Lac, J. C. Wedge.
Fredonia, B. H. Meyer.
Lancaster, Edward Pollock.
Madison, Washburn Observatory.
Manitowoc, Miss Clarina Lüps.
*Prairie du Chien, College Sacred Heart.
Waucousta, G. H. Yapp.

FOREIGN.

*Burnside, S. A., Dr. C. J. Hering.
Grand Turk, W. Indies, Geo. I. Gibbs.
Guanajuato, Mexico, Met'l Obs'y.
Hamilton, Bermuda, Russell Hastings.
Killisnoo, Alaska, Jos. Zuhoff.
Leon, Mexico, Prof. M. Leal.
*Mazatlan, Mexico, Leon P. Acosta.
Mexico, Mexico, Meteorological Obs'y.
Monterey, Mexico, Dr. Wm. De Ryee.
Montreal, Quebec, C. H. McLeod.
New Westminster, B.C., Capt. A. Peele.
Port au Prince, Hayti, Prof. I. Scherer.
Pueblo, Mexico, Mariano Barcena.
*Zacatecas, Mexico, Jose A. y Borrilla.

New observers, commencing observations August, 1888.

*Ash Canyon, Ariz., J. M. Purdy.
Matanzas, Fla., Mrs. B. E. Dupont.

Place of observation and observer.

Mattoon, Ill., Wm. Dozier.
Peoria, Ill., Dr. Fred. Brendle.
*Manhattan, Kans., F. J. Rogers.
Sedan, Kans., J. W. Goodell.
Mio, Mich., J. Randall.
David City, Neb., J. B. Townsend.
Middleburg, N. Y., F. K. Straub.
Demos, Ohio, B. B. Ault.
Gracey, Ohio, H. M. Scott.
Riddleton, Tenn., F. K. Fergusson.
Granbury, Tex., E. H. Snider.
Coventry, Vt., W. H. Tebbetts.
Tyler Creek, W. Va., F. M. Swann.
Rockport, W. Va., R. D. Echols.
Lincoln, Wis., A. J. Looze.

New observers commencing observations September, 1888.

Lochiel, Ariz., San Rafael Cattle Company.
Newark, Del., Prof. Geo. A. Harter.
Quitman, Ga., J. L. Cutler.
Aurora, Ill., M. M. Robbins.
Galena, Md., Henry Parr.
Jewell, Md., Jos. Plummer.
Gambrills, Md., J. E. Moque.
Ozark, Mo., J. J. Brown.
Grand Pass, Mo., E. R. Graham.
Excelsior Springs, Mo., A. Reinisch.
Waddington, N. Y., Joseph Graves.
Somerset, N. Y., J. W. Thurber.
Haverford, Pa. Prof. F. P. Leavenworth.
Brady, Tex., W. H. Potter.
East Berkshire, Vt., J. H. Mears.
Weston, Wis., R. R. Wilkinson.
Cadiz, Wis., B. C. Curtis.
Oshkosh, Wis., Prof. W. N. Mumper.
Delta, Colo., J. A. Curtis.

Military posts from which meteorological reports were received, through the Surgeon General of the Army, in time to be used in the preparation of the Monthly Weather Review for September, 1888.

Alabama.
Mount Vernon B'ks.

Arizona.
Huachuca, Fort.
McDowell, Fort.
Mojave, Fort.
Whipple Barracks.

Arkansas.
Hot Springs.

California.
Angel Island.
Alcatraz Island.
Benecia Barracks.
Bidwell, Fort.
Gaston, Fort.

California—Cont'd.
Mason, Fort.
Presidio of San F.

Colorado.
Lewis, Fort.
Lyons, Fort.

Dakota.
A. Lincoln, Fort.
Bennett, Fort.
Meade, Fort.
Pembina, Fort.
Randall, Fort.
Sisseton, Fort.
Sully, Fort.
Totten, Fort.

Dakota—Cont'd.
Yates, Fort.

Florida.
Saint Francis B'ks.

Idaho.
Boisé Barracks.
Sherman, Fort.

Indian Territory.
*Gibson, Fort.
Reno, Fort.
Supply, Fort.

Kansas.
Hays, Fort.
Leavenworth, Fort.
Riley, Fort.

Maine.
Preble, Fort.

Maryland.
McHenry, Fort.

Michigan.
Brady, Fort.

Minnesota.
Snelling, Fort.

Montana.
Assiniboine, Fort.
Custer, Fort.
Keogh, Fort.
Maginnis, Fort.
Missoula, Fort.
*Shaw, Fort.

Nebraska.
Niobrara, Fort.
Robinson, Fort.
Sidney, Fort.

Nevada.
McDermit, Fort.

New Mexico.
Bayard, Fort.
Selden, Fort.
Union, Fort.
Wingate, Fort.

New York.
Columbus, Fort.
Hamilton, Fort.

New York—Cont'd.
Madison Barracks.
Niagara, Fort.
Plattsburg Barracks.
Wadsworth, Fort.
West Point.

Oregon.
Klamath, Fort.

Texas.
Concho, Fort.
Davis, Fort.
Elliott, Fort.
McIntosh, Fort.
Ringgold, Fort.

Virginia.
Monroe, Fort.

Washington Ter.
Spokane, Fort.
Townsend, Fort.
Vancouver, Fort.
Walla Walla, Fort.

Wyoming.
Bridger, Fort.
D. A. Russell, Fort.
Laramie, Fort.
McKinney, Fort.
Sheridan, Camp.
Washakie, Fort.

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